INTERNATIONAL JOURNAL OF PHYSIOLOGY

2013

INTERNATIONAL

JOURNAL OF

PHYSIOLOGY

International Journal of Physiology

International Journal of Physiology

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Volume 4, Number 1   **January-June 2016**

Study of Changes in Blood Pressure and Lipid Profile in Professional Bus Drivers as an Impact of Stress

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ABSTRACT

Buses were the main mode of public transport in urban areas. Driving a bus in urban area is a highly demanding job and requires lot of physical and mental stability to perform the task with minimal hazards. The bus drivers are under continuous stress during the working hours and are prone for many diseases related to changes induced by stress, especially the cardiovascular and cerebrovascular diseases. The aim of our study is to estimate the blood pressure and lipid profile in bus drivers which are the markers of increased cardiovascular and cerebrovascular risk resulting from stress. The study design was a cross sectional study. The study group is divided into two groups. Group A consists of 50 male subjects who were professional bus drivers and Group B consists of 50 male subjects who were in control group. Blood pressure was measured and blood lipid profile were estimated for both study and control groups, in fasting blood sample. The test was done in our Biochemistry lab by standard enzymatic technique CHOD-PAP, End point method. Statistical analysis was done using the student "t" test. There was statistically significant increase in systolic blood pressure ($p < 0.05$) and diastolic blood pressure ($p < 0.001$) in professional bus drivers compared to control. There was also a highly significant increase in Total cholesterol ($p < 0.001$) , LDL - cholesterol ($p < 0.001$) and decrease in HDL -cholesterol level ($p < 0.05$) in bus drivers compared to controls. The study concludes that stress plays an important risk factor in professional bus drivers and can have cumulative effect to cause acute cardiovascular or cerebrovascular event which can be fatal to the driver.

Keywords: *Stress, Bus drivers, systolic blood pressure, diastolic blood pressure, total cholesterol, Low Density Lipoprotein, High Density Lipoprotein*

INTRODUCTION

Driving is a very complex task that requires full concentration and a calm attitude. The occupation of driving is characterized by high level of pressure to perform a complex task under a rigid time schedule, in conjunction with a high level of responsibility for passengers and equipment and a low level of control over how this task is performed. Hence, the work of professional drivers is considered as extremely stressful. The study by Wang PD et al[1], has shown

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that high work stress has repeatedly been associated with increased risk for cardiovascular disease. Mohd. Rasheeduddin Imran et al[2] has done a study on changes in cardiovascular and cerebrovascular risk factors due to stress in urban professional Bus drivers and found that there is increase in systolic blood pressure , diastolic blood pressure and cholesterol. Stress is nothing but a normal physiological response of the body to situations or stimulus which are perceived as dangerous to the body. When stress occurs regularly or a person is regularly stressed it causes harm to the body. Stress activates the sympatho adrenal medullary and pituitary adreno cortical systems which increases the circulating cortisol and catecholamines, which in turn increase the cholesterol and decrease HDL. Dimsolale JE et al[3],in their study has shown that there is epinephrine mediated rise

in serum cholesterol. O' Donnell L et al[4], has also shown that repeated treatment with norepinephrine, increased the level of LDL. Deverey R et al[5], has studied that catecholamines stimulate hepatic beta-hydroxy-beta-methylglutaryl CoA reductase, the rate-limiting enzyme in cholesterol synthesis. The increase in lipids especially oxidized LDL and the cholesterol predisposes to the development of atherosclerotic changes in the blood vessels. Occupational stressors, including long working hours, time paced work, shift work and high levels of job responsibility may directly contribute to increased health risks. Such stressors are all associated with the occupation of driving a bus. Eisdorfer C et al[6], has shown in the study that stressors may be associated with physiological changes that increase risk of illness and disease. Per Gustavsson et al[7], has shown in their study that there is increased incidence of myocardial infarction among bus drivers compared with controls. According to Nasri H et al[8], cardiovascular diseases of professional drivers remain an important issue in occupational health research and clinical practice. An estimation of blood pressure and lipid profile have been done for professional bus drivers in this study by considering the physiological impact of job itself on the cardiovascular and biochemical changes caused by stress.

MATERIALS & METHOD

The study design was a cross sectional study. This study was carried out in the Institute of Physiology, Madurai Medical College, Madurai. The study group was divided into 2 groups. Group A consists of 50 male subjects who were professional Bus drivers and Group B consists of 50 male subjects who were in control group. The drivers were from the private transport system and the controls were age matched volunteers who doesn't know driving.

Before starting our study, we obtained ethical committee approval and clearance from the college.

Informed consent was obtained from all the subjects who were participating in the study. Subjects included in our study were healthy individuals. Subjects with the history of diabetes, hypertension , hyperlipidemia, intake of drugs, smoking, alcoholism, pulmonary disease and endocrine disorders were excluded from the study.

Measurement of Blood pressure: With a standard mercury sphygmomanometer and the stethoscope, the systolic and diastolic blood pressure were measured carefully by taking the first and fifth Korotkoff sounds using auscultatory method in sitting position of the individual.

Lipid profile: Blood sample collected in the early morning after 12 hours fast was used for estimation of serum Total Cholesterol (TC), Low density lipoprotein (LDL), High density lipoprotein (HDL), and serum Triglycerides (TGL). CHOD-PAP (Cholesterol oxidase method for cholesterol, GPOTRINDER (Glycerol phosphatase oxidase) method for TGL and Phosphotungstic acid method for HDL was used. Serum LDL was calculated using Friedwald's formula:

Serum LDL cholesterol = Total Cholesterol – (HDL cholesterol + Triglyceride/5)

RESULTS

Statistical analysis was done using the student "t" test. Datas' were expressed as mean with standard deviation. Results are showed with the p value. The significance was drawn at p (probability) of 0.001, 0.01, 0.05 that is the results are valid to the extent of 99.9%, 99% & 95% respectively.

Table no.1 shows the comparison of systolic and diastolic blood pressure between Bus drivers and controls. There was a highly significant increase in both systolic and diastolic blood pressure in Bus drivers compared to control subjects.

Table No. 1: Comparison of blood pressure between bus drivers and control group

VARIABLES (mm Hg)	Group A Bus drivers Mean ± SD	Group B Control Mean ± SD	p value
Systolic blood pressure	128.72 ± 23.91	111.2 ± 10.92	< 0.05
Diastolic Blood Pressure	87.52 ± 15.92	74.32 ± 7.2	< 0.001

Table no.2 shows the comparison of lipid profile levels between Bus drivers and controls. Compared to control subjects, there was a highly significant increase in total cholesterol and Low density lipoprotein levels and there was a significant decrease in High density lipoprotein levels in Bus drivers.

Table No. 2: Comparison of lipid profile between bus drivers and control group

VARIABLE (mg %)	Group A Bus Drivers Mean ± SD	Group B Control Mean ± SD	p value
Total Cholesterol	220.00 ± 18.77	160.76 ± 22.44	< 0.001
LDL Cholesterol	163.43 ± 11.72	91.96 ± 20.09	< 0.001
Triglyceride	105.24 ± 25.40	134.32 ± 33.60	< 0.001
HDL Cholesterol	35.52 ± 6.03	41.92 ± 10.87	< 0.05

DISCUSSION

Stress, that is very important concept in life sciences, can affect driver's abilities and behaviour adversely influencing their health. The study by Vivoli et al[9], has shown that emotional stress can provoke noradrenaline secretion. A number of investigators have shown that, emotionally stressful life situations transiently elevate serum cholesterol levels. Dreyfuss, F et al[10], has observed in their study that there is elevation of serum cholesterol in medical students at the time of examinations and Friedman et al[11], observed it in accountants when they were under professional peak loads. Kunihara M. et al[12], have also explained the increase in total plasma cholesterol level is due to the stress-induced catecholamines.

The present study has demonstrated that, there is a significant increase in both systolic and diastolic blood pressure in professional bus drivers, which correlates well with the study by Ragland DR et al[13]. Hartvig, P, et al [14], have also reported that, the systolic blood pressure, diastolic blood pressure and serum cholesterol were higher among drivers. We also find a highly significant increase in the total cholesterol and LDL levels in drivers as compared to the control group which correlates with the same. There is also significant reduction in the HDL levels in the plasma of the Bus drivers when compared to the control group.

The general function of the psychophysiological activation response is the improvement of coping successfully with a stressful situation. This is the principle of an adaptive response. However, Pathological consequences may arise in association with a prolonged stress which causes increase in the concentrations of catecholamines. This so called sustained activation is found to be related to cardiovascular disease. Occupation of professional driver is perceived as very stressful, and stress here is the result of conflict between demands on driver, and low level of control by driver on these demands and circumstances. Both catecholamines and corticosteroids that are secreted in excess during the period of stress enhances lipolytic mechanisms resulting in increase in total cholesterol and LDL levels as well as reduction in HDL levels in the plasma. The increase in the total cholesterol is brought about through the enhancement of Beta – hydroxyl Beta – Methyl glutaryl CoA reductase (HMG-CoA reductase) activity by the catecholamine.

Belkic-K et al[15], has shown that, Professional drivers showed more than twice the overall exposure to stressful work factors compared to the controls. Koda, S et al[16], studied that Odds ratio for hypertension, heart diseases and related subjective symptoms among drivers were significantly increased by job career, twisting posture, vibration and driving stress.

CONCLUSION

This study results has shown highly statistically significant elevation of systolic and diastolic blood pressure which correlates with increase in total cholesterol and Low density lipoprotein levels and statistically significant decrease in High density lipoprotein in professional Bus drivers compared to control subjects. The elevated LDL-cholesterol and lowered HDL-cholesterol levels can predispose the drivers for increased chances of coronary heart disease. Because of the increased health risk, we have to take necessary steps to improve the health of the drivers. Change in environment and working style

may decrease their stress level. An active physical life , that is, regular exercise or practicing yoga is a great stress buster. By maintaining an active social life, that is, spending time with family, friends and relatives can help in dissipating stress. Meditation techniques can also decrease the elevated stress level of a person to normal level. It is important for the drivers to manage stress effectively in order to lead a healthy life and face daily challenges without being overwhelmed and also keep in mind - the safety of many people like the passengers depends on them.

Abbreviations used in the study:

SBP - Systolic blood pressure

DBP - Diastolic blood pressure

TC   - Total Cholesterol

LDL - Low Density Lipoprotein

TGL - Triglycerides

HDL - High Density Lipoprotein

SD   - Standard Deviation

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Gender Differences in Autonomic Nervous System Activity of Children

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ABSTRACT

Background : The autonomic nervous system is of great importance in the regulation of cardiovascular system under both physiological and pathological states. In adults gender differences in the incidence and clinical course of a range of cardiovascular states is well recognized. Also, most of the studies exploring gender differences in ANS activity have been done mainly in adults. Not much work has been done to assess the gender differences in ANS activity in children.

Aims and objectives : The main objective of our study was to first determine the baseline ANS activity in children and also compare it between male and female children in the age group 5 to 10 years.

Materials and Method: In the present study autonomic function tests were conducted in 30 male and 30 female children aged between 5 and 10 years. We performed tests for parasympathetic function (resting heart rate standing to lying ratio, 30:15 ratio and Valsalva ratio) and tests to assess sympathetic functions (blood pressure response to hand grip test and cold pressor response).

Results : No gender differences were found amongst the said age group as regards to ANS activity.

Conclusion: This suggests that gender difference in ANS activity are limited to adolescent and adult age group only and may indicate the role of sex hormones in cardiac autonomic modulation.

Keywords : Autonomic function tests, Pre-pubertal children, gender differences

INTRODUCTION

The autonomic nervous system is of importance in the natural history and treatment of a number of pathophysiological states involving the cardiovascular system. Both short and long term prognosis after myocardial infarction are worse for women than men [1-4] , whereas women with non-ischemic cardiomyopathy have improved survival.[5-6] In addition to the well known difference in age of presentation of coronary heart disease, women are more likely to suffer from Raynaud's phenomenon, and to experience syncopal episodes. Gender differences in the structure and function of the autonomic nervous system is therefore important for a full understanding of a number of common and important clinical presentations.These include hypertension as well as myocardial ischemia and cardiac arrhythmias. It is therefore important to study gender differences in autonomic activity in pre - pubertal children as most studies have been done in adults. If the gender based autonomic differences are present in the pre - pubertal age group also then it would be possible to prevent and predict the outcome of many cardiovascular diseases later in life.

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MATERIALS & METHOD

The study was conducted over a period of 1 year (August 2009 to August 2010) on 30 boys (group A) aged 5-10 years and 30 girls (group B) of the same

age group. It was conducted in the Department of Physiology, Maulana Azad Medical College, New Delhi, India. Children in the two groups were selected from a school on the campus and also recruited from the pediatric clinic and from the relatives of staff members. In both groups care was taken to ensure that none of the children had any neuropsychiatric disorders or other systemic illness capable of affecting autonomic function activity.

Height was measured in cms with the help of a scale with a sensitivity of 0.5cm. Weight was recorded in kg using an Avery scale with a capacity of 120 kg and a sensitivity of 0.05 kg. All anthropometric measurements were done in duplicate.

Before starting the study, each childs parents were informed about the procedures and informed verbal consent was taken.

The parasympathetic and sympathetic autonomic functions were tested separately for both the groups. They were done on Polyrite -8-Medicare machine (Ambala, India). All the tests were done in thermo-neutral conditions and at the same time of the day on all the subjects. Subjects were allowed to acclimatize to the experimental and environmental conditions. All the readings were recorded by a single observer so that interpersonal differences were eliminated. An average of 3 readings were taken for each subject for all the autonomic function tests as well as blood pressure (BP) recordings.

The procedure for doing the tests is as follows:

- For assessing **parasympathetic activity:**

(i) Resting heart rate was calculated from ECG using standard limb leads. [7]

(ii) The S:L (standing to lying) ratio was taken as the ratio of the R-R interval during the 5 beats before lying down to the shortest R-R interval during the 10 beats in the ECG after lying down.[8]

(iii) The 30:15 ratio was calculated as the ratio between the R-R interval at beats 30 and 15 of the ECG recorded immediately upon standing.[9]

(iv) The Valsalva ratio: subjects were asked to exhale into a mouthpiece connected to a mercury manometer and to maintain the expiratory pressure at 40 mmHg for 15 sec. During this manoeuvre and 45 sec afterwards, ECG was recorded. The Valsalva ratio was calculated between the maximum R-R interval (after release of strain) and the minimum R-R interval (during strain).[10]

- For assessing **sympathetic activity:**

(i) BP response to static exercise (Hand grip test -HGT): BP was recorded with the help of a sphygmomanometer and the diastolic BP (DBP) was taken as the point of muffling of sounds. Resting BP was recorded 3 times in each of the subjects. The BP response to static exercise was studied by asking the subject to apply pressure on a standardized hand grip dynamometer at 30% of the maximum voluntary contraction for 1 min. Blood pressure was recorded simultaneously on the non-exercising arm. This was repeated 3 times with an interval of rest between each episode. The change in BP was taken as the difference between the mean of the BP reading during dynamometry and that during rest for both systolic and diastolic blood pressure.[11]

(ii) Cold pressor response (CPR) : Resting BP was recorded with the subject sitting comfortably. Subject was then asked to immerse his hand in cold water while the temperature of water was maintained at 4-6 ^{0}C throughout the procedure. BP measurements were made from the other arm at 30 sec intervals for a period of 2 min after which the subject was asked to remove his hand. Maximum increase in systolic and diastolic pressure were determined and results recorded. In any condition where there is deficient sympathetic outflow the cold pressor test will show a smaller rise in BP. [12]

For each variable group, mean and SD were calculated. Intergroup mean differences were tested for significance by student's t test

RESULTS

The general characteristics of the subjects are shown in **Table 1.**

Table 1: Baseline characteristics of subjects

Variable	Male (n =30)	Female (n = 30)
Age (years)	6.9 ± 1.2	7.0 ± 1.4
Height (cm)	113.8 ± 5.0	109.8± 6.3
Weight (kg)	21.1 ± 3.0	18.5 ± 1.7

The results of the comparative study of autonomic functions are shown in **Table 2** and **Table 3** . No significant difference in any of the parameters can be seen on comparison between the two groups

Table 2: Comparison of parasympathetic function tests. Values are expressed as mean ± SD.

Variable	Males	Females	P value
HR (beats/min)	82.6 ± 5.52	82.5 ± 6.7	>0.05
S:L	1.3 ± 0.04	1.24 ±0.03	>0.05
30:15	1.28 ±0.11	1.26 ±0.77	>0.05
Valsalva ratio	1.25 ± 0.04	1.29 ± 0.06	>0.05

Table 3: Comparison of sympathetic function tests. Values are expressed as mean ± SD.

Variable	Males	Females	P value
HGT DBP (mmHg)	13 ± 2.2	12.8 ± 1.4	>0.05
HGT SBP (mmHg)	13 ± 1.4	12.9 ± 1.4	>0.05
CPR DBP(mmHg)	14 ± 2.3	13.8 ± 1.8	>0.05
CPR SBP (mmHg)	13 ± 2.6	12 ± 1.6	>0.05

DISCUSSION

The autonomic nervous system is of importance in the natural history of a number of pathophysiological conditions of the cardiovascular system including hypertension, MI and arrhythmias.

Gender differences in the autonomic nervous system may be present because of developmental differences or due to the effects of prevailing levels of male and/or female sex hormones.

Some sex differences in the autonomic nervous activity are already present pre-natally. For instance, the distribution of neuropeptides in the brain differs between the brains of premature male and female rats.[13]Female rats have fewer ganglionic neurons [14] wheras acetylcholinesterase (AChE) activity is higher in newborn males than females.[15] Although information is limited, accumulating evidence suggests that gonadal hormones, especially

ovarian hormones, have significant effects on the brain, peripheral efferent nerves and signaling pathways of effector organ/cells that respond to neurotransmitters.

Gonadal hormone signals are mediated through binding of steroids to cytoplasmic/nuclear receptors (genomic actions) and membrane receptors. Cytoplasmic hormone/receptor complexes then bind to DNA and modulate gene transcription. Neurons containing nuclear oestrogen receptors have been identified in brain centers involved in the regulation of cardiovascular function.[16-17] Membrane binding sites for oestrogen, progestrone and testosterone are also present in these regions.[18]

It has been shown that sex hormones affect multiple aspects of central neuronal function. Intravenous or intracerebral administration of oestrogen increased vagal tone and suppressed sympathetic efferent activity in ovariectomized female and male rats.[19-20] Oestrogen increased the density and affinity of muscarinic receptors . [21-22]

The synthesis and clearance of neurotransmitters are regulated by sex hormones. Testosterone activates the catecholamine synthethase tyrosine hydoxylase, TH.[23-25] Vathy et al.[26]observed that male rats had a significantly fewer NA uptake-1 transporters than females in hypothalamus, preoptic area and frontal cortex . Neuropeptide-Y mRNA levels are higher in male than female rats, reduced after castration and restored by testosterone replacement .[27] For cholinergic neurons, the activity of choline acetyltransferase (ChAT) and high-affinity choline uptake (HACU) are higher in female than male rats.[15] Ovariectomy reduces the activities of ChAT and HACU and reduced neuronal acetylcholine content in cerebral cortex and these changes were reversed by administration of oestrogen . [28-29]

As in centrally localized neurons, the synthesis and metabolism of catecholamines and ACh in peripheral neurons are also modulated by gonadal steroids.[30] Mouse hearts from females contain more ACh than those from males.[31]

Inactivation of catecholamines after release depends on neuronal and extra-neuronal uptake by specific transporters. It is not clear whether there are gender differences in this process although some

previous studies indicated a more efficient clearance of exogenous adrenaline in females than males.[32-33] Oestrogen may also upregulate the catalytic activity of catechol-*O*-methyltransferase (COMT) and monoamine oxidase (MAO) . [34]

Recently described effects of oestrogens may also contribute to hormonal modulation of the ANS.In male rats, aging is associated with reduced content of NA which is not present in females.[35-38] Further studies are warranted to examine the significance of this action of oestrogen and its role in sex-difference in autonomic function especially under senescent and pathological conditions.

There are studies that indicate the presence of receptors for gonadal hormones in the CNS, including in regions relevant for the functioning of the autonomic nervous system. Central administration of oestrogen enhances parasympathetic activity. In addition, there is evidence that testosterone enhances NA and NPY synthesis as well as reducing activity of NA clearance. Conversely, oestrogen enhances the activity of choline uptake and acetycholine synthesis. Studies with peripheral tissues also indicate that oestrogen is associated with increased synthesis and release of acetylcholine. All these observations are consistent with the previously discussed observations that, in general, parasympathetic responsiveness is greater in females and sympathetic responsiveness greater in males. Recent developments indicate that oestrogen may also modulate nerve density and survival via effects on nerve growth factor.

All these studies have been done in adults or animal models. Our study here aims to ascertain the status of autonomic activity in the pre-pubertal age group and its gender differences.

CONCLUSIONS

The autonomic nervous system plays a major role in the regulation of the cardiovascular system under both physiological and pathological conditions. There is substantial evidence of gender difference in the functioning of the autonomic system, including specific effects of both male and female sex hormones. In humans, there is a dominance of sympathetic mediated responses in males and of parasympathetic in females.

In our study no differences were found in males and females on the pre-pubertal age group as regards autonomic nervous system activity. This suggests that the differences in autonomic activity occurs after puberty and can be largely attributed to the sex hormones whose levels start to change majorly after puberty.

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Comparative Study of Pulmonary Function Tests during Third Trimester of Pregnancy and Non- Pregnant Women in Bihar

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ABSTRACT

Aims and Objective: The study was conducted to assess the physiological changes in the respiratory system during third trimester of pregnancy.

Materials and Method: The study was conducted on 80 pregnant women in third trimester of pregnancy (cases) and equal number of non-pregnant women (controls) from the same age group of 20 to 35 years. The parameters for pulmonary function tests (PFTs) were FVC, FEV_1, PEFR and FEF $_{25-75\%}$. A PC based Medspiror was used for recording of the parameters. The ratio of FEV_1 and FVC was calculated.

Results: All parameters were found to be declined in cases as compared to controls except FEV_1/FVC. The decrease in FVC was less than the decrease in FEV_1. Therefore FEV_1/FVC was increased.

Conclusion: The study showed that continuous monitoring of PFTs is of great importance in maternal healthcare as cases of restriction and obstruction in lungs during pregnancy can be identified early and its deterioration can be prevented by proper management for safer outcome of the pregnancy.

Keywords: FEV_1/ FVC, Medspiror, Pulmonary function tests.

INTRODUCTION

Many visible and invisible changes occur in human body during pregnancy. The changes occur due to maternal adaptation to the increasing demands of the growing fetus in the uterus [1]. Pregnancy is the best example of selective anatomical, physiological and biochemical adaptation. The respiratory system is highly vulnerable to the adaptation to combat stress, anxiety and fear [2]. It is affected due to increase in size and weight of the fetus[3]. The circulatory system is also overloaded. Apart from the respiratory system and circulatory system, digestive system, endocrine system, excretory system and metabolic system are involved. Various investigators have studied pulmonary function tests during pregnancy [4, 11]. The assessment of the changes in pulmonary function parameters is essential to understand the involvement of respiratory system during pregnancy on the basis of which clinicians should avoid unnecessary interference with treatment and the pregnant women and the fetus can be prevented from the adverse effects of the medicines [4, 5].

Information regarding pulmonary function test is also useful for physical fitness and anesthesia [6]. Although there are so many reports on respiratory changes during pregnancy in western countries are available but very less work has been documented on

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this topic among north Indian subjects.

This study was conducted to evaluate the pulmonary functions of pregnant women in their third trimester and to compare the results with those of non-pregnant women to define the standards of pulmonary function tests and expected respiratory changes in pregnancy.

MATERIALS & METHOD

The study was conducted in the department of obstetrics & gynecology, IGIMS from January, 2012 to December, 2012. There were 80 pregnant women in their third trimester of pregnancy as cases and 80 non-pregnant women as controls. The age group of cases and controls was in the range of 20-35 years. The controls were the relatives of the pregnant women, nurses and other hospital-staffs. The women with known respiratory or cardiovascular diseases, anemia, multiple pregnancy, hydramnios, chronic diseases and chronic therapy for any disease were excluded from the study.

Informed consent was taken from the subjects. Detailed history of the subjects was taken and complete clinical examination was done. The height, weight and the room temperature were recorded.

The pulmonary function tests were done by using computer based MEDSPIROR. Before starting the PFTs, the procedure was thoroughly and clearly explained to each subject. They were told to maintain an effective seal with lips around the mouthpiece and also use the nose clips during procedure. Subjects were allowed to relax for five minutes before the beginning of pulmonary function tests.

The following parameters were recorded in cases and controls:

1. FVC: (Forced vital capacity) - The maximum volume of air expired forcefully after maximum inspiration.

2. FEV1: (Forced expiratory volume in 1st second) the fraction of vital capacity during the 1st second of forced expiration.

3. FEF 25%-75% : forced mid - expiratory flow

4. PEFR: Peak expiratory flow rate

5. FEV1/FVC ratio

The subject was allowed to relax in sitting position for 5-10 minutes and demonstrated the methods of holding sterile mouthpiece and application of nose clips. When the subject understood the methods and became familiar with the procedure, she was asked first to inspire forcefully with maximal effort then instructed to perform maximal expiration. After the procedure, the mouth piece and the nose clip were removed. The actual values and the percentage of values were noted for statistical analysis. The procedure was repeated three times after interval of five minutes. The best reading out of the three readings was taken for statistical analysis. All subjects (cases and controls) were instructed to do the same procedure three times and similarly their best readings were taken for statistical analysis.

STATISTICAL ANALYSIS

Data was recorded and compiled by using Microsoft office 2007 software. Statistical analysis was done by using Student's t-test.

RESULTS

Table 1: Base line data of cases and control group (mean±SD).

Parameters	Cases	Controls
Age (years)	26.58 $\pm$ 3.05	26.24 $\pm$ 3.65
Height (cm)	158.24 $\pm$ 5.05	158.45 $\pm$ 5.15
Weight (kg)	67.50 $\pm$8.75	59.08 $\pm$ 10.25
BMI (kg/m2)	28.18 $\pm$ 3.95	21.58 $\pm$ 3.90
Heart Rate (beats/min)	78.72 $\pm$ 2.65	80.48 $\pm$ 2.90
Systolic BP (mmHg)	124.28 $\pm$ 6.5	116.58 $\pm$ 6.45
Diastolic BP (mmHg)	76.48 $\pm$ 5.05	72.40 $\pm$ 4.85
Hemoglobin (gm/dl)	11.22 $\pm$ 0.73	11.98 $\pm$ 0.65

Table 1 shows base line data of cases and controls. There was no significant difference of mean age between cases and controls. The body weight of cases was higher as compared to those of controls and the heights of both the groups were comparable. The Body Mass Index (BMI) of study group was higher than the control group. Heart rate and blood pressure were almost comparable in study group and control group. Mean hemoglobin concentration in the

study group was slightly less than that of the control group and it was found to be statistically significant (p<0.01).

Table 2: Pulmonary function parameters of cases and controls (mean±SD).

Pulmonary function parameters	Cases	Controls	P value
FEV$_1$ (%)	78.55 $\pm$ 9.48	82.98 $\pm$ 5.45	0.005
FVC (%)	88.94 $\pm$ 7.58	95.32 $\pm$ 3.46	0.004
FEV$_1$/FVC ratio	84.97 $\pm$ 6.54	84.47 $\pm$ 6.52	0.475
PEFR (%)	90.75 $\pm$ 9.39	96.11 $\pm$ 5.44	0.005
FEF 25%-75%(%)	88.78 $\pm$ 9.98	92.98 $\pm$ 7.06	0.006

DISCUSSION

In this present study all parameters of pulmonary function tests except FEV1/FVC ratio were found to be decreased in cases as compared to that of controls. Although FEV1 as well as FVC both decrease but decrease in FVC is more than FEV1, therefore FEV1/FVC ratio was increased. It occurs most probably due to slight increase in intrapleural pressure caused by the upward displacement of the diaphragm in the third trimester of pregnancy [7].

Decrease in FVC and increase in oxygen demand leads to hyperventilation. Hyperventilation causes CO_2 wash out which results into bronchoconstriction and dyspnoea which could be the reason of decreased FEV1, PEFR and FEF 25%-75% [12]. Another possible reason of such reduction could be lesser force of contraction by the expiratory muscles like abdominal muscles and internal intercostal muscle [6, 8, 9, 10, and 11]. PEFR is more sensitive to muscular strength of respiratory muscles. Since muscles become weak in anemia, the PEFR could have been reduced in anemia but since hemoglobin content of the subjects in our study was found to be in the normal range, the decrease in PEFR in subjects due to anemia is ruled out which is inconsistent with the study conducted by Puranik et al [10, 13]. G Grindheim et al found in 2011 that FVC and PEF both increase during pregnancy [14]. It was not consistent with our study. Probably it might have been due to the parity and the stage of the pregnancy. Sushma Jadhav A et al in 1n 2013 found that all parameters of pulmonary function tests,

FEV1, FVC, PEFR and MVV significantly decline in third trimester of pregnancy due to elevation of the diaphragm and restriction of the lung movements [15]. The findings of this study were similar to that of our study.

Thus our study validates the physiological changes and the adaptations in the respiratory system in the third trimester of pregnancy due to which physiological parameters of PFT are declined. The enlarged gravid uterus displaces the diaphragm upward which reduces FVC in pregnancy. In addition to mechanical factors hormonal factors are also contributory to the changes in parameters of pulmonary function tests (FEV1, FVC, PEFR and FEF 25%-75%).

CONCLUSION

The present study shows that the pulmonary function parameters are significantly reduced due to gravid uterus in the third trimester of pregnancy. Pulmonary function test values shows gradual diminution in various parameters in second and third trimester of pregnancy. Extensive studies on larger population should be done. Correction factors should be introduced and errors should be ruled out.

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Metabolic Syndrome in COPD; A Case Control Study from Himachal Pradesh

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ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) has become an important non-communicable disease worldwide with a rising global incidence. It is a major cause of morbidity and mortality globally. Co-morbid conditions usually have significant impact on health status, healthcare utilization, all-cause hospital admissions and mortality in COPD patients. Metabolic syndrome (MetS) is a common co-morbidity in COPD and is a risk factor for cardiovascular disease (CVD). This case control study was designed to assess the association of metabolic syndrome with COPD.

Methods: It was a case control blinded observational study. We evaluated 266 patients; 142 consecutive COPD patients and 124 age and sex-matched controls without COPD and cardiovascular disease from the medicine and pulmonary medicine outpatient department.

Results: Prevalence of MetS was significantly higher amongst patients of COPD compared to controls 69.7% vs. 30.6% and odd ratio of 5.2 (95% C.I. of 3.0 to 8.7, p< 0.0001). Frequency of MetS according to severity of COPD were 72.7%, 76.5%, 63.6%, and 67.7% in GOLD stages I, II, III, and IV respectively.

Conclusion: The frequency of MetS high in COPD patients and COPD is an independent predictor of MetS. Screening for MetS should be a part of routine evaluation of people with COPD.

Keywords: *Metabolic syndrome, COPD, cardio vascular diseases.*

INTRODUCTION

COPD is a common lifestyle related disease in genetically predisposed individuals. It is a progressive disease characterized by airflow limitation that is either not reversible at all or only partially reversible. Systematic review and meta-analysis of 67 studies revealed prevalence of physiologically defined chronic obstructive pulmonary disease in adults aged ≥40 yrs is 9–10%[1]. An international multicentre study (BOLD project) reported a prevalence of advanced (stage II or higher) COPD of 8% to 10%; with heterogeneity across centers and sex[2, 3, 4]. COPD is expected to become the third leading cause of mortality and fifth leading cause of disability-adjusted life years (DALYS) by the year 2020[5, 6].

The morbidity and mortality is increased in patients with associated comorbidities e.g. metabolic syndrome, atherosclerotic vascular disease, obesity, sleep apnoea syndrome and heart failure etc[7-11]. Among various co-morbidities, cardiovascular disease is a major problem in patients with COPD[11, 12].However, even in advanced COPD; cardiovascular disorders are responsible for large number of death, accounting for mortality in nearly 25% of patients[11].

Metabolic syndrome is characterized by central obesity, an elevated level of triglycerides (TGs), elevated blood pressure, a decreased level of high-density lipoprotein (HDL) cholesterol, and an increased level of glucose. MetS increases CVD risk by 2 times 1 and type 2 diabetes mellitus risk by 5 times.[18]

The aim of this study was to compare the

prevalence of metabolic syndrome in people with COPD age and sex matched controls and to examine the relationship between various predictors of Metabolic syndrome in people with COPD.

MATERIAL & METHOD

Study design: It was a prospective case control blinded observational study. We evaluated 266 patients; 142 consecutive COPD patients and 124 age and sex-matched controls without COPD and cardiovascular disease recruited from the medicine and pulmonary medicine outpatient department.

Study population and sampling size; All consecutive patients suspected to have COPD and attending Pulmonary medicine and Medicine outpatient on pre specified days and who consented to participate in the study were screened for COPD. COPD patients were diagnosed based on relevant symptoms, physical examination, and presence of risk factors.

Diagnosis of COPD was confirmed by post-bronchodilator spirometry which was performed 15 min after administration of four doses of salbutamol sulfate (100 μg per dose). Pre- and post-bronchodilator spirometry was performed according to American Thoracic Society/European Respiratory Society recommendations using a spirometer (Spirolab 11)[14] in all subjects. The diagnosis of COPD and its severity were determined according to Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria[15]. Patients fulfilling criteria for COPD were enrolled as cases and those who did not fulfil the standard diagnostic criteria were enrolled as controls**.** Detailed history was taken from each eligible patient. Exposure to tobacco smoke and biomass fuel smoke and its intensity and duration were recorded. Physical examination included recording of BP, waist circumference, weight and height using appropriate tools and following standard guideline. Clinical examination of respiratory system was carried out to document obstructive airway disease and to rule out other forms of pulmonary diseases.

MetS was defined by modified NCEP ATP III criteria for south Asian population as any three out of following five: Waist circumference >90cm in male and >80 cm in female, Fasting glucose >100 mg/dl, Systolic BP>130 mmHg or diastolic BP >85 mmHg

or on treatment of hypertension, HDL cholesterol <40 mg/dl in men and <50 mg/dl in females or specific medication, TG >150 mg/dl or on specific medication[16].

Physical activity index (PAI) was calculated by using The Global Physical Activity Questionnaire developed by WHO for physical activity surveillance. It collects information on physical activity participation in three settings (or domains) as well as sedentary behaviour, comprising of 16 questions (P1-P16). The domains are: Activity at work, Travel to and from places, Recreational activities. Physical activity index was calculated by sum total minutes of moderate activity multiplied by four and total minutes of vigorous activity multiplied by eight[17].

Biomass fuel exposure index was calculated by daily hours of exposure multiplied by years of exposure. Blood biochemistry was done in a fasting state to estimate Blood sugar, Lipid profile was measured using standard kits in fully automatic auto analyzer and LDL-C was derived using Freidwald formula (none of our patient was having triglyceride levels >400). Arterial sample was taken in heparinised 2 ml syringe from radial artery to estimate Po_2, Pco_2 and SPo_2 in patient with severe and very severe disease.

STATISTICAL ANALYSIS

Results were expressed as mean ± SD for quantitative variables and percentages for qualitative variables. Chi-square was performed in order to identify differences in categorical variables between subgroups. Paired t Test was used to test the significance of the results obtained. The association of demographic characteristics and CV risk factors with COPD was analyzed by calculating Odds ratio and their 95% C.I. and significance of differences in mean values between study groups was compared using unpaired t test. Independent association of MetS as a measure of insulin resistance adjusted for age and sex with COPD was analyzed using logistic regression analysis. Categorical variables were reported as percentages and continuous variables as mean±sd. 2 tailed significance at <0.05 was taken as statistically significant. Statistical analysis was performed using Epi info, version 3:4

RESULTS

Details of clinical characteristics of COPD patients and controls are depicted in tables 1 and 2 and Clinical characteristics of COPD patients with and without Metabolic syndrome in tables 3 and 4. Patients of COPD and controls were matched for age and sex (54.8±11.8) years vs. (53.5±11.6) and 84(59.2%) vs. 67(54.0%) respectively.

Distribution of COPD patients according to severity of COPD and gender are depicted in table 5. Of 142 COPD patients in study population when analysed distribution of gender in COPD patients according to severity of COPD; Of the total 142 patients 84(59.2%) were male and 58(40.8%). In male COPD patients 20(66.6%), 21(61.8%), 24(54.5%), and 19(61.3%) in mild, moderate, severe, very severe respectively and 84(59.2%) of the total male study population.

In female COPD patients 13(39.4%), 13(38.2%), 20(45.5%), and 12(38.7%) in mild, moderate, severe, very severe respectively and 58(40.8%) of the total female study population. (Table-5, Figure-1).

Frequency of metabolic syndrome in COPD patients and controls: Prevalence of Metabolic syndrome was significantly higher amongst patients of COPD compared to controls 99(69.7%) vs. 38(30.6%) and odd ratio of 41.53; p<0.0001.

Frequency of distribution of components of MetS in COPD patients: In our study, 45(45.5%) patients had 3 components of metabolic syndrome, whereas number of patients with 4 components of metabolic syndrome was 39(39.4%) and while 15(15.2%) patients had all the 5 components of metabolic syndrome. The most frequent association in COPD patient with metabolic syndrome was dyslipidaemia (low HDL in 76.1% and high TG in 31.7% patients), hypertension (71.8%), diabetes mellitus or impaired fasting blood glucose (64.1%) and visceral obesity (59.9%) of the patients.

Correlation of severity of COPD with prevalence of MetS: Of the 142 COPD patients, 99 (69.7%) patients had MetS and frequency of MetS according to **GOLD stages I, II, III, and IV** were 72.7%, 76.5%, 63.5%, and 67.7% . COPD was significantly associated with higher Smoking index, BMF exposure index, truncal obesity, physical inactivity, hypertension, Diabetes

and dyslipidaemia. Modelling these variables into linear regression revealed COPD as an independent predictor of metabolic syndrome. Association between Po_2, Pco_2 and SPo_2 with Metabolic syndrome was not found to be statistically significant in correlation matrix.

DISCUSSION

The main finding of our study was a high prevalence of MetS of 69.7% in COPD patients compared to 30.6% in patients without COPD (95% C.I. of 3.0 to 8.7, p< 0.0001) as shown in table -1. Watz et al[19] noticed MetS in almost half of the patients with chronic bronchitis and COPD, average 47.5%. Mean age of patients in our study was lower (54.8±11.8 vs. 53.6±11.6 years) for both COPD patients and controls. The mean age in a study by Marquis et al[18] for COPD patients was 66±7 years and mean age for controls was 63±6.

Watz et al[19] had reported a mean age of 64.0±6.5 in their COPD cohorts. In our study the possible reasons for early age of onset of COPD could be early age of smoking, early and increased duration of exposure of biomass fuel and ETS. We reported a higher frequency of MetS in female patients of COPD, 72.4% compared to male patients 67.9% (p= 0.462). Mean smoking index was higher in COPD group compared to controls (818.7±524.0 vs. 610±497.1) (p=001) as shown in table-2. Mean smoking index was also higher in COPD patients with MetS compared to COPD patients without MetS (929.3±532.6 vs. 564.1±405.8) (p<0.000) as shown in table-4.

The frequency of central obesity was higher in COPD patients than that of controls (**57.7%** vs. 27.4%) (p= 0.015) as shown in table -1. Frequency of central obesity was also higher in COPD patients with MetS than that of COPD patients without MetS (79.8% vs. 21%) (p = 0.005) as shown in table -3.

The frequency of hypertension was higher in COPD patients than that of controls (**68.3%** vs. 50.8%) (p=0.045) as shown in table -1.We reported a higher frequency of hypertension in COPD and with increasing severity of COPD. The frequency of diabetes was higher in COPD patient than that of controls (22.5% vs. 12.1%) (p=0.026) as shown in table -1. The frequency of diabetes was higher in patients of COPD with MetS than that of COPD patients without

MetS (30.3 vs. 4.7%) (p=0.001) as shown in table -3.

Our study showed higher frequencies of dyslipidemia when compared with previous studies, and the frequency of dyslipidemia showed increasing trend with increase in the severity of COPD. The increasing trend of dyslipidemia in our study could be higher number of diabetic patients in severe and very severe group of COPD.

On bivariate correlation analysis, MetS was correlated with smoking index, biomass fuel exposure index, physical activity index, waist circumference, hypertension, diabetes, total cholesterol, TG, LDL, FEV_1/FVC ratio. Whereas on linear regression analysis, independent predictors of MetS were found to be   age, smoking status, smoking index, BMF Index, physical activity index, waist circumference, diastolic BP, low HDL, and FEV1.

LIMITATION

This study has some limitations: small sample size and is a hospital based sample with referral biases. The cross-sectional case control study observational study design of the study precludes attribution of causality between COPD and MetS cannot be estimated. And the exact prevalence of MetS in COPD population cannot be estimated. As we did not measure serum or plasma biomarkers of inflammatory or oxidative pathways, we could not assess the importance of these pathways in the relationship of COPD with MetS.

Table No. 1.Clinical characteristics of Study population (discrete variables)

Characteristics	Control (n=124)	COPD patients (n= 142)	Odds ratio	P value
Male (n/%)	67(54.0%)	84(59.2%)	0.708	0.400
Rural (n/%)	95(76.6%)	91(63.8%)	4.996	0.026
Smokers (n/%)	102(82.3%)	118(83.1%)	0.033	0.857
BMF exposure (n/%)	87(70.2%)	108(76.1%)	1.174	0.278
Obese (n/%)	40(32.3%)	62(43.7%)	3.661	0.056
Truncal Obesity (n/%)	34(27.4%)	82(57.7%)	25.293	0.000
High Blood Pressure (n/%)	63(50.8%)	97(68.3%)	8.486	0.055
DM (n/%)	15(12.1%)	32(22.5%)	5.076	0.026
Dyslipidemia - Low HDL / Hypertriglyceridemia/ on Rx(n/%)	82(66.1%)	109(76.8%)	3.693	0.045
MetS (n/%)	38(30.6%)	99(69.7%)	41.53	0.000

Table No. 2.Clinical characteristics of Study population (continuous variables)

Characteristic	Controls (n=124)	COPD patients (n=142)	P value	95% Confidence Interval	
				Lower	Upper
Age(years)	53.59±11.683	54.88±11.835	.374	-1.560	4.135
Smoking index	610.00±497.110	818.73±524.017	.001	-332.119	-85.346
BMF exposure index	78.71±114.494	93.35±64.315	.209	-37.543	8.272
Physical activity index	1524.35±931.273	1182.68±709.81	.001	139.366	543.991
BMI(kg/m²)	22.36±4.490	24.85±4.300	.000	-3.558	-1.427
Waist (cms)	83.92±9.246	86.91±9.132	.009	-5.214	-.764
SBP(mmHg)	130.95±19.560	140.34±20.517	.000	-14.230	-4.543
DBP(mmHg)	79.66±7.053	83.18±7.745	.000	-5.309	-1.735
FBS (mg%)	102.89±20.552	106.05±21.624	.746	-4.257	5.936
HBA1C (%)	5.274±1.3727	5.761±1.7411	.011	-.8631	-.1103
T.Cholesterol (mg%)	117.42±22.185	137.92±58.959	.000	-31.019	-9.973
Triglyceride (mg%)	132.27±45.366	140.06±61.193	.236	-20.698	5.118
HDL(mg%)	46.60±26.938	39.24±21.047	.015	1.456	13.259
LDL(mg%)	65.71±34.582	81.25±34.502	.000	-23.905	-7.183
FEV1/L	2.1351±.56235	1.1670±.37451	.000	.85085	1.08537
FEV1/FVC/L	82.86±9.313	58.48±13.948	.000	21.551	27.218

Table no. 3. Clinical characteristics of COPD patients with and without MetS (discrtete variables)

Characteristics	COPD patients without MetS (n= 43)	COPD patients with MetS (n= 99)	Odds ratio	P value
Male(n/%)	27(62.8%)	57(57.6%)	0.339	0.561
Rural (n/%)	26(60.5%)	65(65.7%)	0.348	0.554
Smokers (n/%)	37(86%)	81(81.8%)	0.393	0.537
BMF exposure (n/%)	31(72.1%)	77(77.8%)	0.522	0.466
Obese (n/%)	13(30.3%)	49(49.5%)	4.630	0.033
Truncal Obesity (n/%)	03(07%)	82(82.8%)	78.733	0.000
High Blood Pressure (n/%)	10(23.3%)	87(87.9%)	57.591	0.000
DM (n/%)	02(4.7%)	30(30.3%)	13.909	0.001
Dyslipidemia - Low HDL / Hypertriglyceridemia/ on Rx (n/%)	21(48.8%)	80(80.8%)	14.279	0.000

Table no. 4. Clinical characteristics of COPD patients with and without MetS (continuous variables)

Characteristic	COPD patients without METS (n= 43)	COPD patients with METS (n= 99)	P value	95% Confidence interval	
				Lower	Upper
Age(years)	54.35±12.417	53.26±11.399	.625	-3.324	5.496
Smoking index	564.19±405.805	929.29±532.658	.000	-527.381	-202.833
BMF expsure index	60.12±46.400	107.78±65.832	.000	-66.857	-28.466
Physical activity index	1895.81±717.078	872.93±429.488	.000	787.331	1258.438
BMI(kg/m²)	23.91±3.829	25.26±4.446	.069	-2.814	.107
Waist (cms)	79.40±6.492	90.17±8.148	.000	-13.326	-8.227
SBP(mmHg)	127.26±22.082	146.02±16.998	.000	-26.307	-11.222
DBP(mmHg)	76.93±8.455	85.90±5.572	.000	-11.782	-6.155
FBS (mg%)	89.14±12.996	110.53±21.458	.000	-27.182	-15.589
HBA1C (%)	4.56±.678	6.28±1.803	.000	-2.141	-1.316
T.Choleterol (mg%)	115.93±32.291	147.46±65.194	.000	-47.742	-15.327
Triglyceride (mg%)	120.44±42.211	148.58±66.195	.003	-46.462	-9.806
HDL(mg%)	40.53±30.040	38.68±15.796	.703	-7.869	11.585
LDL(mg%)	70.28±32.453	86.02±34.432	.011	-27.749	-3.733
FEV_1 /L	1.09±.370	1.20±.374	.126	-.240	.030
FEV_1/FVC /L	54.72±16.644	60.11±12.340	.061	-11.036	.255

Table.5. Distribution of COPD patients according to severity of COPD and gender

SEVERITY OF COPD	MALE (n=84)	FEMALE (n=58)	Total & % of total (n=142)
Mild COPD	20(66.6%)	13(39.4%)	33(23.2%)
Moderate COPD	21(61.8%)	13(38.2%)	34(23.9%)
Severe COPD	24(54.5%)	20(45.5%)	44(31%)
Very Severe COPD	19(61.3%)	12(38.7%)	31(21.8%)
Total	**84(59.2%)**	**58(40.8%)**	**142(100%)**

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Pre-hypertension and Hypertension : Prevalence and its Awareness among Personnel of Administrative Class in Agra

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ABSTRACT

Background: According to recent studies, average prevalence of hypertension in India is 33.8% in urban and 27.6% in rural areas. The lifestyle and level of stress has always been strongly co related with level of Blood Pressure.

Objective: This study was undertaken to assess the prevalence of prehypertension, hypertension and associated risk factors among personnel of administrative class of Agra, Uttar Prdaesh .

Material and method: This cross sectional study was carried out in different administrative departments of Agra City and involved 150 personnel age 30 or more who were interviewed with structured questionnaire (tobacco use, alcohol consumption etc) and physical parameters of height, weight, BMI, blood pressure were taken to collect data. Chi - square test was done to analyse data.

Results: Prevalence of hypertension was higher (39.2%) in males as compared to females (26.6%). Overall prevalence of prehypertension and hypertension was 54% and 38% respectively. It was high in overweight, obese personnel and consuming alcohol or tobacco. Awareness of hypertension was 49.1% and among subjects taking treatment 30 %.had their blood pressure controlled.

Conclusion: Along with charm of affluent life, stressful and unhealthy lifestyle is consistent part of people working in different administrative sections of government especially involving decision making posts. This section of society needs to be aware of these facts and as a health professional we need to motivate them to make changes in lifestyle as well as to lessen stress in daily life.

Keywords: Prevalence, Hypertension, Prehypertension, Mental Stress, Lifestyle.

INTRODUCTION

Hypertension, one of the determinants and important predictor in the development of coronary artery diseases and cerebro vascular accidents is reported to be the fourth contributor to premature death in developed countries and seventh in developing countries (Deepa R[1] et al. 2003). Recent reports indicate that nearly 1 billion adults (more than a quarter of world's population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2028 (Kearney PM[2] et al. 2005) .

It is now ranked third as a cause of disability adjusted life years (Ezzati M[3] et al .2002).The World Health Report 2002 states that elevated blood pressure alone contributes to about 50% of cardiovascular diseases worldwide and CVDs will be the largest cause of death and disability by 2020 in India .

The Epidemiology of hypertension in terms of it's importance as a risk factor for cardiovascular diseases, continues to be a major area of research .A meta analysis of hypertension prevalence rates in India (Gupta R[4] et al 2004) demonstrated a significant increase in prevalence of hypertension with higher prevalence in urban compared to rural areas.

Studies from Agra (1963, Mathur K.S.[5]) and Rohtak (Gupta 1978) using WHO criteria (systolic BP ≥ 160 and /diastolic BP ≥ 95 mmHg)showed prevalence 4.35 and 6.43 % respectively .The Jaipur Heart Watch study (Gupta R 2002[6]) and Chennai Urban and Rural Epidemiology Study (CURES)(Mohan V[7] et al 2007) reported the prevalence of Hypertension to be 37 and 20%respectively using JNC- VI /VII guidelines (Hypertension if systolic BP ≥ 140 and/diastolic BP ≥ 90 mmHg)(VI JNC)

There is recent inclusion of the term 'Pre Hypertension' (defined as the blood pressure systolic 120 to 139 mmHg or diastolic 80 to 89 mmHg) which is now considered as starting point in development of cardiovascular diseases. Moreover, Pre hypertension has been associated with higher cardiovascular risks and is estimated to decrease the average life expectancy by as much five years (Chobanian A.V.[8] 2003).

Compared to other population, the prehypertension prevalence rate is higher among affluent urban Indians (Joshi SR[9] 2007).

A big part of problem of rising cardiovascular and other non communicable diseases is the "life style" of affluent section of the Indian society. Working in administration offers a comfortable and financially attractive life. At the same time it also has stress at work place which results in increased incidence of various non communicable diseases such as Hypertension.

This study was aimed to estimate the prevalence of pre Hypertension and hypertension in administrative personnel of Agra.

MATERIAL & METHOD

This cross sectional epidemiological descriptive study was carried out for duration of one and half years from March 2009 to August 2010 under Department of Physiology S.N. Medical college of Agra.

The study aimed to estimate the prevalence of pre hypertension and hypertension, its association of risk factors, awareness about it among study population which comprised of personnel working in administrative capacity in various departments of Agra city.

According to various the overall prevalence of hypertension was 55%. in 40-60 years of age group (Kutty VR[10] 2000), 33.5% between 45 – 64years age group (Raheena Beegom [11] et al 1995) in urban population of south India .Based on these reports, a sample size was calculated and rounded of to 150 by using formula given by Cochran.

Simple random sampling technique was used and all personnel working in administration were included irrespective of their age and gender. Cases of secondary hypertension and subjects unwilling to participate were excluded.

All subjects were explained about purpose of study and informed consent was taken. A pre-tested semi structured questionnaire was used, which collected information on demographic characteristics (age, gender, religion etc) dietary habits, consumption of alcohol, tobacco chewing and smoking. Using height and weight , Body Mass Index (BMI)was calculated and classified in to categories of normal 18.5 – 25kg/m2 ,overweight (25- 29.9),and obese(≥ 30).

Measurement of Blood Pressure: It was recorded by auscultatory method with mercury sphygmomanometer. Subjects were asked to take rest of five minute prior to measurement and to avoid caffeine, smoking for at least 30 min and instructed as number of factors cause significant variations in measurement of blood pressure like nicotine consumption, exercise, bladder distension etc. They were placed in comfortable sitting posture with back supported and legs uncrossed and were asked to uncover the area to place the cuff keeping its lower edge 2 to3 cm above the bend of elbow and tied around middle of right upper arm. After palpation of brachial artery, chest piece of stethoscope was placed on in the anticubital fossa. Radial artery was palpated and the cuff was inflated to a level at which pulse disappeared. The pressure was gradually released at rate of 2 to 3mmHg per second. Systolic pressure was noted as reading at which first Kortokoff sound appeared and diastolic was noted at which sounds disappeared. Three consecutive readings were recorded.

Those who were taking antihypertensive drugs were considered as hypertensive because in prevalence study both old and new cases are considered.

JNC VII criteria was used to classify subjects as normotensive (SBP < 120 mmHg and DBP <80 mmHg), Pre hypertensive (SBP 120-139 mmHgor DBP 80-89 mmHg) and hypertensive (≥140orDBP≥90 mmHg).

RESULT AND DISCUSSION

The overall prevalence of hypertension in study was 38%, which was higher to prevalence of 27.5% in Delhi (Chaturvedi S [12]et al 2007,age group 20 -59)and comparable with 37.1% from Kerala (KR Thankappan[13] et al 2006), 33.3% from Assam (>30 years of age, Hazarika NC[14] et al 2003).

Out of 150 personnel, there were 135 males and 15 females. Prevalence of hypertension was higher (39.2%) in males as compared to females (26.6%)(Table 2),higher to reported rate by Seedat YK[15] , et al (25,6% of males ,20% of females)though lower to study by Zachariah MG[16] et al2003(25.6% males , 20% females).

Age wise prevalence of hypertension was 15.3%, 36.7% ,50% and of prehypertension was 76.9% ,54.4% and 42.8% in age group of 30-39, 40-49, 50-59 years respectively(Table 1).

Several studies indicate positive correlation with higher prevalence of hypertension as well as prehypertension with overweight[17][18].Prevalence of hypertension was high (49.1%) in overweight group, 31.8% in obese but prehypertension was more prevalent than hypertension in these groups.

All normotensive were either underweight or had normal BMI and these observations were significant (p<0.05) (Table 3).

Prevalence of hypertension was more (40.5%) among alcoholics in comparison to that in non alcoholics (37.0%) which was insignificant (p>0.05).In view of social inhibition to admit addiction of alcohol information was not reliable and may reflect under reporting. There was 45.5% prevalence of hypertension among personnel consuming tobacco in comparison to 32.9% in those who did not take it and was statistically significant (p<0.05) (Table 4&5). Higher proportion of people consuming alcohol and tobacco and further higher prevalence of hypertension among taking these substances emphasize the need to highlight their role and accordingly people must be advised to give up the use of these substances.

Family history of hypertension among parents or sibling is for hypertension as well as cardiovascular disorders (Stamler R[20]. Prevalence of hypertension among personnel with positive family history (62.5% n= 32) was significantly higher than those with no family history in this study.

Among hypertensives, 28 out of 57(49.1%) were aware of their hypertensive status.71.4%(n=28)ofaw are subjects were taking proper treatment and rest were advised to control their blood pressure by diet, reducing salt intake and regular exercise.6(30% n= 20)of treatment taking group and 4(50% ,n= 8)of not taking medication group had their blood pressure under controlled.

Table 1 : STAGE WISE DISTRIBUTION OF BLOOD PRESSURE AND PREVALENCE OF HYPERTENSION AND PREHYPERTENSION (CRITERIA - JNC7) ACCORDING TO AGE

Age (years)	No. Examined	Normotensives No.(%)	Prehypertensive No.(%)	Hypertension No. (%)	
30-39	26	2 (7.6)	20 (76.9)	4 (15.3)	
40-49	68	6 (8.8)	37 (54.4)	25 (36.7)	χ^2= 9.58 df=4 p=0.048
50-59	56	4 (7.1)	24 (42.8)	28 (50)	
60-	0	0	0	0	
Total	**150**	**12 (8)**	**81(54)**	**57(38)**	

Table 2 : PREVALENCE OF HYPERTENSION AND PREHYPERTENSION AMONG MALES AND FEMALES

Particulars	Frequency	Normotensive	Prehypertensive	Hypertensive	
Male	135	9 (6.6)	73 (54.1)	53 (39.2)	$\chi^2 = 3.56$ df=2 p=0.168
Female	15	3 (20)	8 (53.3)	4 (26.6)	
Total	**150**	**12(8)**	**81 (54)**	**57 (38)**	

Table 3 : PREVALENCE OF HYPERTENSION AND PREHYPERTENSION ACCORDING TO GRADES OF OBESITY

BMI (kg/m²)	No. examined	Normotensive No.(%)	Prehypertensive No. (%)	Hypertensive No. (%)	
< 18.5(under wt)	3	3 (100)	0	0	$\chi^2= 27.7$
18.5-25(normal)	72	9 (12.5)	39 (54.1)	24 (33.3)	
>25 – 30(over wt)	53	0	27 (50.9)	26 (49.1)	df=6
>30 (obese)	22	0	15 (68.1)	07 (31.8)	p= 0.01
Total	**150**		**81 (54)**	**57 (38)**	

Table 4 : ADDICTION OF TOBACCO(SMOKING /SMOKELESS) AND HYPERTENSION

Particulars	Frequency	Normotensive No. (%)	Prehypertensive No.(%)	Hypertensive No.(%)	
No addiction	91	11(12.1)	50(54.9)	30(32.9)	$\chi^2= 6.41$ df=2 p= 0.04
Smoking/Guthka	59	1(1.6)	31(52.5)	27(45.7)	
Total	**150**	**12(8)**	**81(54)**	**57(38)**	

Table 5 : ADDICTION OF ALCOHOL AND HYPERTENSION

Addiction of Alcohol	Frequency	Normotensive No. (%)	Prehypertensive No.(%)	Hypertensive No.(%)	
No	108	11(10.1)	57(52.7)	40(37.0)	$\chi^2= 2.50$ df=2 p= 0.28
Yes	42	1(2.38)	24(57.1)	17(40.4	
Total	**150**	**12(8)**	**81(54)**	**57(38)**	

Table 6 : FAMILY HISTORY OF HYPERTENSION AMONG STUDY GROUP

Particulars	Frequency	Normotensive No. (%)	Prehypertensive No.(%)	Hypertensive No.(%)	
+ve	32	0	12(37.5)	20(62.5)	$\chi^2= 11.73$ df=2 p= 0.0028
-ve	118	12(10.3	69(59.7)	37(31.8)	
Total	**150**	**12(8)**	**81(54)**	**57(38)**	

TABLE 7 : AWARENESS, TREATMENT AND CONTROL AMONG HYPERTENSIVES

Age group (years)	Hypertensives N(%)	Aware N(%)	Unaware N(%)	Taking treatment N(%)	No treatment N(%)	Controlled (medication grp)N(%)	Controlled (no medication) N(%)
30-39	4 (15.3)	3 (75)	1 (25)	2(66.6)	1 (33.3)	0	1(100)
40-49	25 (36.7)	10 (40)	15 (60)	7(70)	3 (30)	2 (28.5)	0
50-59	28 (49.1)	15 (53.5)	13 (46.4)	11(73.3)	4 (26.6)	4 (36.3)	3(75)
60	0	0	0	0	0	0	0
Total	**57**	**28 (49.1)**	**29(50.8)**	**20(71.4)**	**8 (28.5)**	**6 (30)**	**4 (50)**

CONCLUSION

In this study it was observed that more than one third of personnel of administrative class suffered from hypertension and there was also high prevalence of prehypertension. High blood pressure is well known major risk factor for stroke, heart failure, and kidney damage. According to National institute of lung heart and blood institute of America the risk of death from heart disease and stroke begins to rise at blood pressures as low as 115 over 75,and that it doubles for each 20 over 10mm Hg increase. Unless preventive measures are taken, stiffness and other damage to arteries progress with advancement age and develop in to hypertension which becomes more difficult to treat if detected late. The prehypertension category reflects this risk and is an alarming sign to detect this group and take preventive action early.

Life style factors like sedentary life, lack of exercise, unhealthy dietary habits, and excess use of salt and consumption of tobacco, alcohol are strongly correlated with prehypertension and hypertension. Several studies suggest that weight reduction through diet and regular physical exercise has been associated with reduction in blood pressure. It has been shown that 5% weight loss is associated with reduction in renin-angiotensinogen levels, decreased sympathetic activity and improved endothelial function, thus improving blood pressure in hypertensive subjects .This study may help in identifying administrative personnel at risk of developing hypertension and healthy habits should be promoted among this type of group by different types of interventions.

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Effects of a Single Session of Yogic Relaxation on Cardiovascular Parameters in a Transgender Population

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ABSTRACT

Aim and objective: This pilot study was done to determine effects of a single session of yogic relaxation on cardiovascular parameters in a transgender population.

Methods: Heart rate (HR) and blood pressure (BP) measurements were recorded in 106 transgender participants (mean age of 23.86 ± 7.87 y) attending a yogic relaxation program at CYTER, MGMCRI. Participants practised a series of techniques consisting of quiet sitting, om chanting, mukha bhastrika, nadi shuddhi, brahma mudra, pranava pranayama in sitting posture and savitri pranayama in shavasana. HR, systolic (SP) and diastolic pressure (DP) were recorded before and after the 60 minute session using non-invasive blood pressure (NIBP) apparatus. Pulse pressure (PP), mean pressure (MP), rate-pressure product (RPP) and double product (DoP) indices were derived from recorded parameters. Student's paired t test was used to compare data that passed normality testing and Wilcoxon matched-pairs signed-ranks test for others. P values less than 0.05 were accepted as indicating significant differences for pre-post comparisons.

Results: All recorded cardiovascular parameters witnessed a reduction following the session. This was statistically more significant (p < 0. 0001) in HR, MP, RPP and DoP and significant (p = 0.002) in SP.

Conclusion: There is a healthy reduction in HR, BP and derived cardiovascular indices following a single yogic relaxation session in a transgender population. These changes may be attributed to enhanced harmony of cardiac autonomic function as a result of mind-body relaxation program. It is suggested that an open and non-hostile environment is conducive for obtaining such a state of psychosomatic relaxation and that such opportunities for transgender participants should be created in all healthcare facilities.

Keywords: Yoga, cardiovascular, relaxation, transgender.

INTRODUCTION

The art and science of yoga has a lot to offer all sections of society as it enables a wholesome flowering of human potential across all human-made barriers such as class, creed, religion, language, nationality; and even across the natural divisions of gender and age. It is hence surprising that a MEDLINE search conducted with the terms "yoga and transgender" didn't come up with even a single publication in this population. This statistic is quite a mind-opener as this population is under great stress and at an increased risk of suicide, eating disorders and substance misuse. [1]

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It has been suggested that health care practitioners need to improve awareness and take steps to create an open, non hostile environment to overcome the suboptimal provision of health care for transgender individuals.[1] Sri Balaji Vidyapeeth (SBVU), a deemed to be university in Pondicherry, India has taken innovative steps in creating such an open and non-hostile environment through its community outreach, education and research activities facilitated through a special Transgender Clinic functioning in Mahatma Gandhi Medical College and Research Institute (MGMCRI). A half dozen transgender individuals have been given administrative postings as well as responsible duties thus enhancing their status in society and also providing opportunities for self growth and development. The Centre for Yoga Therapy, Education and Research (CYTER) has been actively involved in providing yoga therapy for many transgender individuals for the past four years. The authors have received positive and appreciative feedback on numerous occasions from these participants who expressed their satisfaction with physical and mental benefits they obtained through yoga.

Though the multifaceted physiological and psychological health benefits of both short and long term yoga training are quite well established, [2-4] very few studies have reported on the immediate effects of a single session. We have earlier published reports on the significant reductions in cardiovascular parameters following a single yoga session in a retrospective study of 1896 patients from CYTER [5] and also found the same to be true in a geriatric population. [6] The magnitude of reductions in heart rate (HR) and blood pressure (BP) differed in different groups of patients depending on pre-existing medical conditions as well as the specific yoga therapy protocol adopted for them. Keeping all the above in mind, this pilot study was done to assess the effects of a single 60-min session of yogic relaxation on cardiovascular parameters in transgender individuals.

MATERIALS & METHOD

The present study was conducted at CYTER functioning at MGMCRI under auspices of the SBVU, Puducherry, India. As it is part of the desertion project of the fourth author who is completing his Masters (MSc) degree in nursing at Kasturba Gandhi Nursing College of SBVU, ethical clearance was obtained from its IHEC. All the study participants were from the SCOHD Society of Pondicherry. Informed consent was obtained from participants and the yogic relaxation sessions carried out in CYTER Yoga hall between 11am and 12 noon in a quiet environment, with comfortable temperature and subdued lighting. The participants had been advised to finish breakfast at least 2 hours earlier and come after emptying bowel and bladder.

HR and BP measurements were recorded from 106 participants (mean age of 23.86 ± 7.87 y), who were attending this yogic relaxation program. Participants were taught and practised under supervision a protocol especially designed for them keeping in mind their health status and requirements. Each session started with three minutes of quiet contemplative sitting and was followed by three rounds of om chanting. The participants were then led through nine rounds each of mukha bhastrika (bellows breath) and nadi shuddhi (alternate nostril breathing). They then practised nine rounds of brahma mudra turning the head away from a neutral position in four directions (right, left, up and down) on inspiration, followed by the movement of the head brought back to the centre while producing audible sounds of aaa, ooo, eee, mmm respectively on expiration. This was followed by pranava pranayama (sectional breathing with audible sounds of aaa, uuu and mmm on exhalation) in the sitting posture and finally savitri pranayama in shavasana (slow, deep, rhythmic breathing in a 2:1:2:1 pattern of inspiration: held-in: expiration: held-out). Each session ended with another three rounds of om chanting and a quiet sitting period of three minutes.

Non-invasive blood pressure (NIBP) apparatus was used to record HR, systolic pressure (SP) and diastolic pressure (DP) readings before and after the 60 minute session. To ensure objectivity, all recordings were performed using non-invasive automatic BP monitor (Omron HEM 7203, Kyoto, Japan) that uses oscillometric method with an instrumental accuracy of ± 5% for HR and ± 3 mm Hg for BP. The pre-session recordings were taken after 5 min of quiet comfortable sitting while post-session recordings were taken at the end of the session. Pulse pressure (PP), mean pressure (MP), rate-pressure product (RPP) and double product (DoP) indices were derived from the recorded parameters.

Data were assessed for normality using GraphPad InStat version 3.06 for Windows 95, (GraphPad Software, San Diego California USA, www.graphpad.com). Student's paired t test was used to compare data that passed normality testing by Kolmogorov-Smirnov Test (HR, MP and DoP) and Wilcoxon matched-pairs signed-ranks test for those that didn't (SP, DP, PP and RPP). P values less than 0.05 were accepted as indicating significant differences for pre-post comparisons.

RESULTS

All recorded cardiovascular parameters and derived indices witnessed a reduction following the single session of yogic relaxation and the results are given in Table 1. This was statistically more significant (p < 0. 0001) in HR, MP, RPP and DoP and significant (p = 0.002) in SP. It was however not statistically significant in DP (p<0.0820) and PP (p< 0.1009).

DISCUSSION

It has been suggested that the modulation of stress response systems through yoga occurs by a reduction of perceived stress and anxiety that in turn decreases physiological arousal resulting in lowered HR, BP and respiration. [7] Our present study confirms this postulate as all participants reported a sense of being at ease, or at peace with themselves after the interactive session. This sense of inner peace (sukham) is vital for the relaxation response to 'kick in' and produce the psychophysiological changes witnessed in our study. Even a single session of yogic relaxation has significant cardiovascular effects in a transgender population. This reflects a healthier autonomic regulation of the heart due to either an overall increase of vagal parasympathetic tone and/or a reduction in adrenergic sympathetic tone.

RPP and Do P are indirect indicators of myocardial O_2 consumption and thus reflects overall load on the heart. Hence, reductions in both of them signify a healthy lowering of the strain on the heart. [8,9] Sympathetic activation is known to increase HR and RPP and decrease overall heart rate variability (HRV). The RPP can also provide a simple measure of HRV and is considered a surrogate marker in situations where HRV analysis is not available. [10] It is worth noting that both SDNN and total power of HRV have been reported to be inversely correlated with mean HR and RPP. Hence decreases witnessed in our participants can be taken to imply a healthier HRV that may possibly prevent heart diseases in transgender population who are already under immense psycho-physiological stress [8]

An earlier study at SVYASA, Bangalore compared O_2 consumption and respiration following four yoga postures interspersed with relaxation and supine relaxation alone, and concluded that the combination of stimulating and relaxing techniques reduced physiological arousal better than the mere practice of relaxation techniques alone. [11] Even though the practical performance of various yoga techniques may seem to be stimulatory in nature, they suggested that the ultimate physiological effect of such techniques is in fact more relaxatory. This hypothesis is also corroborated by another study from JIPMER, Pondicherry reporting that relaxation in shavasana is enhanced by the addition of savitri pranayama thus resulting in a 26% reduction of O_2 consumption. [12]

As our yogic relaxation session consisted primarily of pranayama, we hypothesize that this is producing a healthier cardiac autonomic balance in our subjects irrespective of their initial condition. We also noticed that reductions were greater in those who had abnormal readings in the initial testing as opposed to those in whom the initial readings were within normal range. The yoga tradition extols yoga as a state of harmonious balance (*samatvam yoga uchyate* - Bhagavad Gita) and this restoration of physical, mental, emotional and spiritual balance may be a prime factor behind the positive changes seen in our participants.

Transgender individuals are often in turmoil with internal conflicts about gender identity or discomfort in an assigned gender role, especially when they desire transition. Such people who experience discord between their gender and the expectations of others or whose gender identity conflicts with their body, may benefit by talking through their feelings in depth. This can alleviate suffering and restore functionality. [13] The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association refers to the topic as gender dysphoria and this may manifest clinically as either depression or the inability to work and to form healthy relationships with others. [14] We suggest

that a yogic relaxation programme can be offered on a regular basis in all health care facilities to enable such individuals to get a sense of positive inner relaxation. This will help them live a happier and healthier life with a positive sense of self esteem.

Our present study is limited by the fact that we have only taken into consideration the cardiovascular effects of a single session of yogic relaxation. We plan further comprehensive short and long term studies to shed light on potential psycho-physiological health benefits of yoga for transgender population as these may help understand inherent mechanisms of action better.

CONCLUSION

There is a healthy reduction in HR, BP and derived cardiovascular indices following a single session of yogic relaxation in a transgender population. These changes may be attributed to enhanced harmony of cardiac autonomic function as a result of mind-body relaxation due to the specific program. It is imperative that an open and non hostile environment is created where such individuals can feel safe and at ease with themselves. The authors commend Sri Balaji Vidyapeeth for having initiated such an innovative program in its university premises thus fulfilling this felt need. We recommend that such an integrated yoga program should be part of the heath care facilities for transgender population as it can enhance their quality of life and improve their overall health status.

Table 1. Heart rate (HR), systolic pressure (SP), diastolic pressure (DP), Pulse pressure (PP), mean pressure (MP), rate-pressure product (RPP) and double product (DoP) before (B) and after (A) a single session of yogic relaxation in transgender population.

Parameter	B	A	p value
HR (bpm)	77.11 ± 9.03	73.14 ± 9.29	<0.0001
SP (mmHg)	119.33 ± 11.49	115.53 ± 9.60	0.0020
DP (mmHg)	71.39 ± 8.99	69.69 ± 8.61	0.0820
PP (mmHg)	47.94 ± 11.21	45.84 ± 9.86	0.1009
MP (mmHg)	87.37 ± 8.37	84.97 ± 7.65	0.0002
RPP (units)	92.14 ± 14.97	84.75 ± 14.63	<0.0001
DoP (units)	67.43 ± 10.80	62.29 ± 10.77	<0.0001

Student's paired t test was used to compare data that passed normality testing by Kolmogorov-Smirnov Test (HR, MP and DoP) and Wilcoxon matched-pairs signed-ranks test for those that didn't (SP, DP, PP and RPP). P values less than 0.05 were accepted as indicating significant differences for pre-post comparisons.

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Electro-retinogram Changes in Adult Individuals with Myopia

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ABSTRACT

AIM: The aim of the study is to evaluate the retinal function,especially ganglion cell functional changes in macula in individuals with high myopia using Pattern Electroretinogram(PERG).

OBJECTIVES: -Recording axial length &PERG in 128 eyes of 64 individuals (4 groups)with myopia.

-Comparing PERG wave amplitudes among individuals with low & high myopia

-Comparing PERG wave latencies & correlating axial length changes with PERG waveforms

SUBJECTS: Total of 64 subjects were included in the study of 18-30 years age group of both sexes.The subjects were divided into 4 groups according to refractive error as

Group-1(controls):0 D to -0.75D

Group-2: -1.00 to -3.00D

Group-3 : -3.25 to -6.00D

Group-4: -6.25 to -10.00D

METHOD: Statistical analysis was done using window stat software version 9.2 applying ANOVA test& unpaired t-test.Axial lengths of both the eyes of 64 subjects were recorded using A scan ultrasonography.

Amplitudes & latencies of P50 & N95 waves of PERG were recorded using RETIMAX CSO EQUIPMENT following ISCEV GUIDELINES for PERG 2012 update.

RESULTS: P50 & N95 wave amplitudes were lower in high myopes than low myopes(group2,3,4 compared to group 1)(p<0.001)

-P50 wave latencies were prolonged in individuals in group2,3,4 compared to group1(p<0.001)

-N95 wave latencies were prolonged in group 3, 4 compared to group 1(control group)

CONCLUSION : Decreased P50 amplitude indicates a macular functional disorder in subjects with high myopia & decreased N95 amplitude shows ganglion cell dysfunction. Thus the PERG findings show that macular &ganglion cell disorder contributes to decreased visual performance in myopia.

Keywords: Myopia, Electroretinogram, Pattern Electroretinogram, Macula, Ganglion cell function.

INTRODUCTION

To the clinical and vision science communities, the term myopia describes a condition in which the focussed image falls anterior to retinal photoreceptor layer of the eye.Although, the prevalence of myopia varies by the country, age and by ethnic group it is a major cause of visual impairment in both the developed and developing world[1]. The prevalence of myopia has been reported to be as high as 70-90% in some Asian population with Taiwan reporting a myopic prevalence of 84% among 16-18 - years - old high school students[2,3]

More than twenty years ago in a mini-review on aetiology of myopia, Phillips wrote that 'the retina may not be the passive victim of scleral growth, but may conceivably be the author of its own destruction'[4]. Over the intervening years the evidence that refractive error can wreak 'destruction' upon

the eye ,has grown considerably. As well as the long recognised association of high myopia with retinal detachment and myopic maculopathy.

These studies have revealed a complex web of interactions involved in the optical control of eye growth and, in fulfilment of the above speculative comment, have indeed demonstrated the central role of retina and intra-retinal processing in the controlof eye growth[5].Myopia affects approximately 25% of the population in

United States[6-9]and is a significant public health problem because it is associated with increased risk for visual loss[10-14]

High myopia (refractive spherical dioptric power of -5.00 or higher)is a major cause of legal blindness in many developed countries[15-17] Juvenile onset myopia most often develops and progresses between the ages of 10-16yrs,whereas pathological myopia usually begins to develop in the perinatal period & is associated with rapid refractive error myopic shifts before 10-12 yrs of age[18,19]

High myopia is associated with progressive and excessive elongation of the globe which maybe accompanied by degenerative changes in the sclera, choroid, bruch's membrane, retinal pigment epithelium & neural retina[20]

The axial elongation that accompanies myopia has been reported to produce certain anatomical changes which may result in impaired retinal function and ultimately alter visual performance.

Retinal function in human myopic eyes has been investigated objectively with electrophysiological techniques.The retina is known to be involved in development of myopia and the associated elongation of the eye.It is known that retinal electrical responses derived from electroretinogram are reduced in amplitude in myopic eyes and that ERG amplitude decreases proportionately with increasing axial length[21,22,23.]

The retina is a very thin sheet of tissue(200μm thick) that lines the eyeball.Photoreceptors capture photons, convert their light energy into chemical free energy and ultimately generate a synaptic signal for relay to other visual neurons in the retina back of the eye and contains the light sensitive photoreceptors.

Each human eye has more than 100×10^6 photoreceptors but only 1×10^6 ganglion cells which implies a high degree of convergence of information as it flows from the transducing cells to the output cells.

Thinness of mammalian retina has interesting biophysical consequences. Because the signalling distances are so short, synaptic potentials can spread effectively within its neurons without the help of conventional action potentials. Electrotonic spread of potentials along the dendrites is generally enough.The main exceptions are the ganglion cells which use action potentials to spread visual information along their axons to the thalamus[24]

On an average 60 rods & 2 cones converge on each ganglion cell & optic nerve fibre leading from the ganglion cell to the brain. However, major differences exist between the peripheral retina & central retina..These effects progressively increase the acuity of vision in the central retina.

ERG is the time course of the voltage difference across the eye or across the retina elicited by light stimulation[25]

It is an electrical potential generated by the retina in response to a change in illumination & is an excellent tool for evaluating retinal function because it can be recorded noninvasively under nearly physiological conditions.

The pattern ERG measures the response to a temporally changing pattern of contrast at a constant level of luminance, providing information about ganglion cells and generalised macular function[26]

The PERG was first recorded in 1964 when RIGGS & his associates used the technique to record from a local retinal area.The normal response consists of atleast

NORMAL PERG
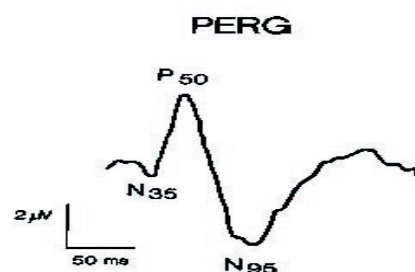
Fig no : 1 – Normal PERG labelled[37]

three waves. The first small cornea negative wave arises with a delay of about 35ms,called N35.The second, a major positive wave peaks at about 50ms called P50 , is followed by a negative trough at 95ms called N95. GRONEBERG and TEPING were among the first to provide clinical evidence for the suggestion that the PERG originated from the inner retina.

They assumed that the PERG is closely related to activity of the third order retinal neuron i.e., the retinal ganglion cells. Their proposal is supported by histological investigation.[27]

The PERG is sensitive to early ganglion cell dysfunction. The ON &OFF pathways are of equal importance in shaping the transient PERG waveform[28]

MATERIALS & METHOD

- Prerequisite: clear media & normal fundus by ophthalmoscopic examination.
- Place of study : PROVISION, Nampally. Hyderabad.
- Informed consent was taken after obtaining ethical clearance.

Table no :1 -STUDY POPULATION AND CRITERIA

128 eyes of 64 subjects were evaluated together

GROUP	REFRACTIVE ERROR	NUMBER OF SUBJECTS
1(CONTROL GROUP)	Between 0.00 & —0.75 D	16
2(STUDY GROUP)	Between —1.00 & —3.00 D	16
3(STUDY GROUP)	Between —3.25 & —6.00 D	16
4(STUDY GROUP)	Between —6.25 & —10.00D	16
		TOTAL: 64 subjects

-Subjects with refraction between 0.00 & -10.00 D &18-30 yr age group were included in the study. Subjects with any ocular disease of optic nerve, retina

& subjects on systemic medication which will alter ERG values.

-Base level visual acuity & refractive error using correctable lenses was measured.A –scan ultrasonography was done to measure the axial lengths of both the eyes.

PERG METHODOLOGY

PERG RECORDING

- PERG was recorded strictly following ISCEV GUIDELINES (2012 update) using

RETIMAX CSO EQUIPMENT.

- PROCEDURE:

3 electrodes were placed bilaterally (active electrodes-loop electrodes were placed as a loop over lower fornix after topical anaesthesia , ground electrode & reference electrodes) Subject was made to sit comfortably ,with a stable head position , at a distance of 30 cm from TV monitor which displays the checkerboard pattern(stimulus for standard PERG).Subject was asked to fix his / her vision at a point in the centre of pattern field & PERG recording was obtained.

The layouts of PERG obtained from individual subjects of each group are given below.

- X axis showing duration in milliseconds(ms) , Y axis showing amplitudes in microvolts(μv).

- Note the decrease in P 50 and N 95 amplitudes in group 2, 3 & 4

- Calibrations for PERG recordings were made according to the guidelines of the International Society for Clinical Electrophysiology of Vision (ISCEV) as described in the methods.

PERG - LAYOUTS

Graph 1: Group-1(control)   **Graph 2: Group - 2**
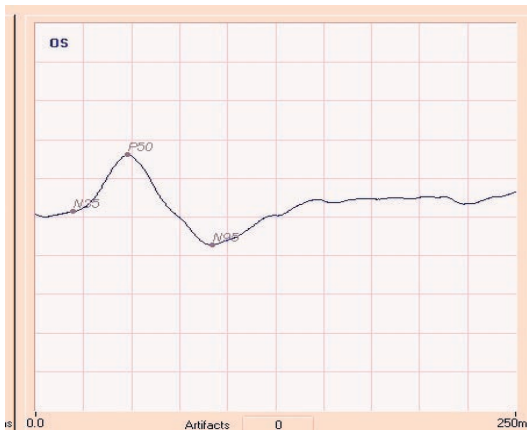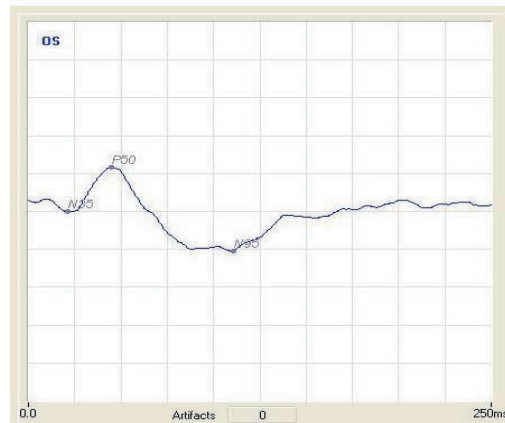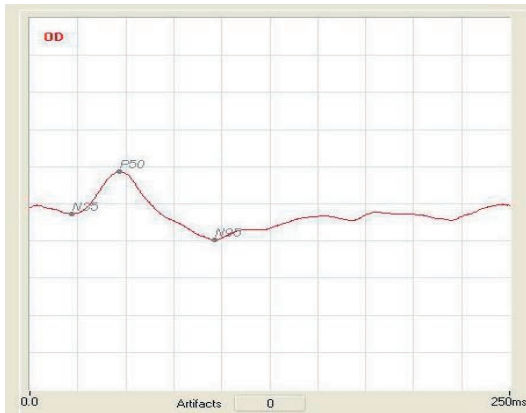
Graph 3: Group -3   **Graph 4 : Group - 4**
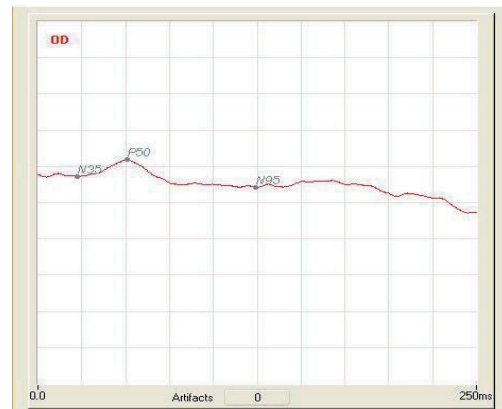
x-axis : showing amplitude

y axis : showing latency

RESULTS

- Results were analysed using WINDOWSTAT software version 9.2 applying ANOVA test , unpaired T- test, Pearsons correlation analysis.

- **Table no 2: The means obtained for different parameters among different groups include:**

PARAMETER	GROUP-1	GROUP-2	GROUP-3	GROUP-4
REFRACTIVE ERROR	−0.3 ± 0.28	−2.12 ± 0.52	−4.7 ± 0.74	−8.05 ± 1.24
AXIAL LENGTH	24.09 ± 0.42	24.55 ± 0.49	25.02 ± 0.44	26.92 ± 0.83
P50 WAVEAMPLITUDE	4.98 ± 0.26	3.81 ± 0.36	3.13 ± 0.51	2.43 ± 0.82
P50 WAVE LATENCY	46.04 ± 1.80	46.29 ± 1.93	47.82 ± 2.31	53.86 ± 5.74
N95 WAVEAMPLITUDE	7.29 ± 0.32	6.30 ± 0.58	5.28 ± 0.62	4.23 ± 0.7
N95 WAVE LATENCY	92.50 ± 5.49	89.70 ± 6.06	93.09 ± 6.08	100.84 ± 9.07

FINDINGS

• With increase in the refractive power axial length increased.There was a statistically significant (p<0.001) reduction in P50 & N95 amplitudes in study group (Group 2,3,4) compared to Group – 1 (control group) . There was a statistically significant(p <0.001) prolongation of P50 wave latencies in study group (Group 2,3,4) compared to control group.There was a statistically significant prolongation of N95 latencies in Group 3, 4 compared to control group(Group -1)

DISCUSSION

The key ocular parameters that determine the refractive error are refractive dioptric power, depth of anterior chamber & axial eye length. The axial elongation that accompanies myopia has been reported to produce retinal stretching, thinning, reduced retinal cell density & photoreceptor changes. Such anatomical changes may result in impaired retinal function & ultimately alter visual performance.

In this study an attempt has been made to compare the amplitudes and latencies of pattern electroretinogram waves in adults with different grades of myopia. Transient PERG was done.There was a significant correlation of pattern ERG waves P50 & N95 amplitudes, latencies, refractive error & axial lengths of the individuals among different groups. The PERG wave amplitudes decreased with increase in refractive error & axial length . (p< 0.001)

Myopia is the most common human eye disease and severe cases(high myopia>5D)may lead to blinding disorders such as retinal detachment, premature cataract & macular degeneration In myopia it is thought that thinning in the macular region is due to loss of the ganglion cell layer.

The most characteristic and common complication of high myopia is myopic maculopathy or retinopathy. Despite its importance in terms of public health, myopic maculopathy stands out as the only disease amongst top five causes of blindness that remains entirely untreatable.

Several hypotheses have been put forward to explain why altered ERG responses occur in physiologically myopic eyes reduced ERG amplitude is likely to suggest a low retinal cell responsivity. It

has also been suggested that other factors such as an increase in subretinal space or a change in the morphological profiles of the retinal cells due to an increase in axial length contribute to the decrease in ERG potentials in myopic eyes[29]

Certain retinal factors which contribute to the decreased amplitudes include decreased retinal photoreceptor density, morphological changes in the photoreceptor outer segment, and photoreceptor dysfunction.

Differences observed in the ERG responses of myopes and emmetropes might be due to altered synaptic transmission or damage to the inner plexiform layer[30]

The signal delay in myopics might also suggest differences in the kinetics of synaptic transfer from photoreceptors to ON & OFF pathways of bipolar cells & ganglion cells.[31]

Other possible retinal processes that could explain the altered responses in myopia are in the dopaminergic system[32]

Dopamine levels are reduced in form deprivation myopia[33] and dopamine agonists have been shown to inhibit myopia[34]

Dopamine is also involved in the reorganisation of receptive field properties that accompany changes in retinal illuminance. It modifies the spatial &dynamic properties of the ganglion cell responses and alters contrast sensitivity[35]

Various methods have been employed in an attempt to decrease the progression of myopia[36]. Thus PERG could be used as an early diagnostic tool to detect decreased macular function and for implementing an appropriate treatment strategy to prevent progression of visual loss in high myopia.

CONCLUSION

The most characteristic & common complication of high myopia is myopic maculopathy or retinopathy, which stands out as one of the top five causes of blindness. In the absence of degenerative changes in the fundus on ophthalmoscopic examination it is difficult to decide whether the myopia is simple or pathological.Various methods have been employed in

an attempt to decrease the progression of myopia.

By arresting the progression of the disease , the vision can be maintained or improved.Thus PERG could be used as an early diagnostic tool to detect decreased macular function for implementing an appropriate treatment strategy to prevent progression of visual loss in high myopia.

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A Descriptive Study of Physical Activity Level in I Year Medical Students of Bangalore Medical College and Research Institute- A Pilot Project

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ABSTRACT

Back ground: Sedentary lifestyle is associated with diabetes mellitus type 2, metabolic syndrome and cardiovascular illness. Medical students who spend most of their time in academic pursuits may be sedentary

Aims: To study the physical activity pattern of I year MBBS students

Setting and design: This study is the pilot project of a larger cross sectional survey

Method and material-A convenience sample of 54 students of I Year MBBS of Bangalore medical college filled the Global physical activity level questionnaire.

Statistical analysis used: A descriptive data of mean, SD, maximum and minimum values of each of the category of Physical activity were noted from statistical analysis using SPSS 16. Bar diagrams were drawn to describe each subtype of physical activity.

Results and conclusion: In each subtype of physical activity, there were large number of students who engaged in zero activity. Most students showed large number of hours spent on a day sitting. Out of 54 students, 14 showed inadequate activity. There is a pressing need to make students aware of diseases associated with a sedentary lifestyle. They should be encouraged to increase their physical activity level for a healthy future.

Keywords: Physical activity, sedentary lifestyle, MBBS students

INTRODUCTION

Sedentary lifestyle is associated with type 2 diabetes mellitus[1], cardiovascular diseases[2] metabolic syndrome[3], breast cancer[4] and colon cancer[5, 6]. Physical activity in all age groups gives bountiful benefits. Regular physical activity helps control weight, reduces the risk of developing diabetes type 2, metabolic syndrome, obesity, cardiovascular diseases, some types of cancers, improves moods and mental health, improves ability to do activities of daily living, prevents fractures, falls , strengthens bones and muscles[7].

Patients of cardiovascular diseases who have led a sedentary life are encouraged to start and engage in physical activity in small incremental doses[8]. The habit of engaging in regular physical activity should be cultivated right from childhood. In a large scale study conducted in 2013, only 29% percent of high school students had participated in at least 60 minutes per day of physical activity on each of the 7 days .[9 10.]

Medical students spend a large number of hours on academic pursuits. This may make them sedentary and susceptible to non communicable diseases like metabolic syndrome at a younger age.The aim of our study was to observe the pattern of physical activity level and sedentary hours in I year medical students.

MATERIALS & METHOD

After taking an informed consent , students aged 19 years who were studying in I year MBBS

of Bangalore medical college and research institute were recruited for the study were asked to fill the Global physical activity level questionnaire. Inclusion criteria were healthy students. Exclusion criteria were those on many medications, those who had any acute or chronic illness and those who had any physical disability which might impair their ability to involve in physical activity. 54 students completed the questionnaire.

The Instrument used was the Global physical activity level questionnaire that was administered by an interview. A slight modification was applied to the questionnaire to include occupation related activity to mean activity at medical college between 9am and 4pm. For example, if a student engaged in playing basket ball between 11 am and 12noon, it was included under occupation related activity.

The Global physical activity Questionnaire (GPAQ) is an instrument which assessed the physical activity of a person during the last week. It had 16 questions. The first 6 questions were occupation related physical activity. The next 3 questions were travel related physical activity. The next 6 questions were on recreation related physical activity. The last question was on sedentary hours spent sitting or reclining except sleep hours. In the occupation related physical activity and recreation related physical activity, the first 3 were about vigorous intensity physical activity that substantially increased the heart rate and the breathing rate, while the next 3 questions were on moderate intensity physical activity which was identified by a moderate increase in pulse rate and breathing. Each of the set of 3 questions resulted in total number of vigorous/ moderate physical activity entered in minutes. While the time spent on vigorous intensity physical activity during past week was multiplied by 8, the moderate intensity of physical activity during the past week was multiplied by 4.

Data were entered in Microsoft excel and analyzed using SPSS 16. Of the 54 subjects, 14 of them had inadequate physical activity.

Table-1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Work related Vigorous activity	54	0	5760	779.26	1526.159
Work related Moderate activity	54	0	11520	890.74	2016.119
Travel related physical activity	54	0	5040	535.93	870.579
Recreation related Vigorous activity	54	0	7200	928.89	1538.550
Recreation related Moderate activity	54	0	84	19.19	27.106
Total physical activity	54	0	19560	3756.48	4599.676
Sedentary activity	54	0	1400	394.26	296.595

Graph-1

Graph 2

Graph-3

Travel related physical activity

Graph-4

Recreation related Vigorous activity

Graph 5

Recreation related Moderate activity

Graph 6

Total physical activity

Graph-7

Sedentary activity
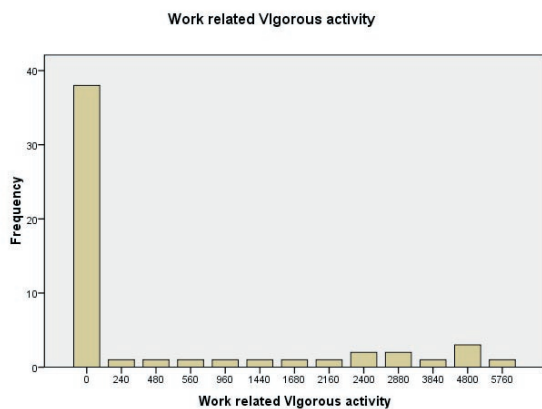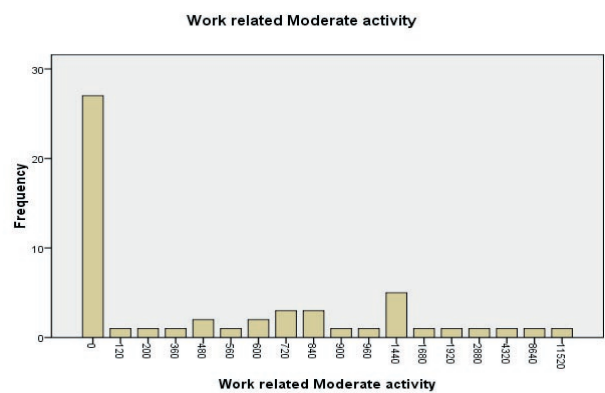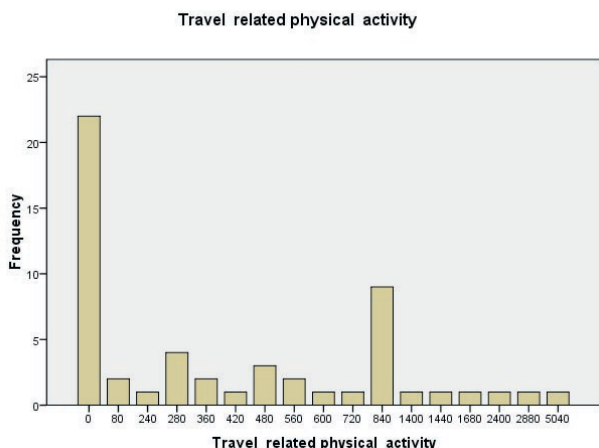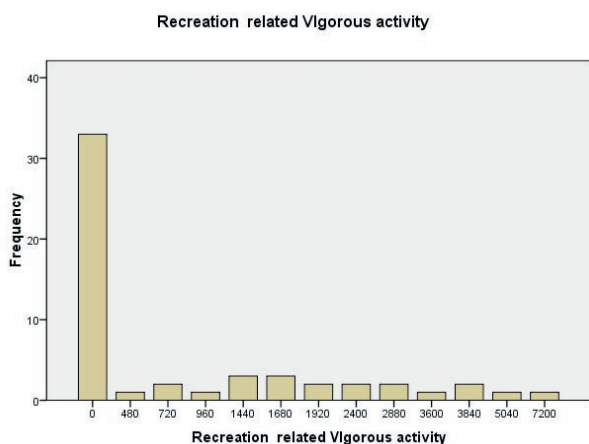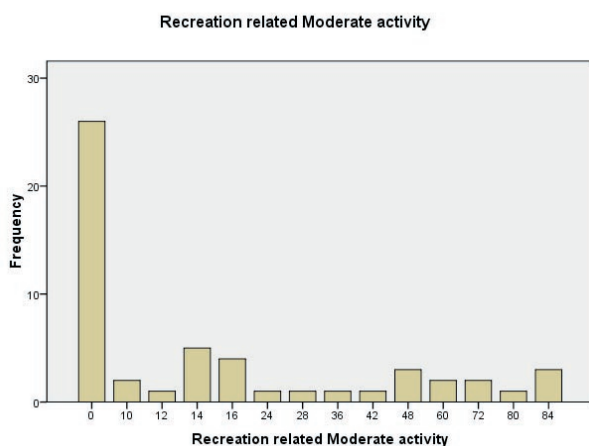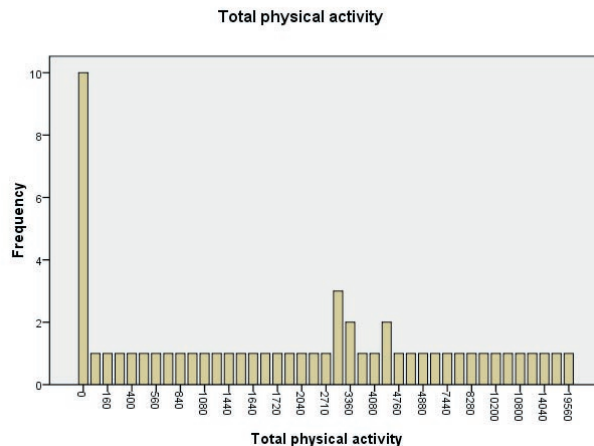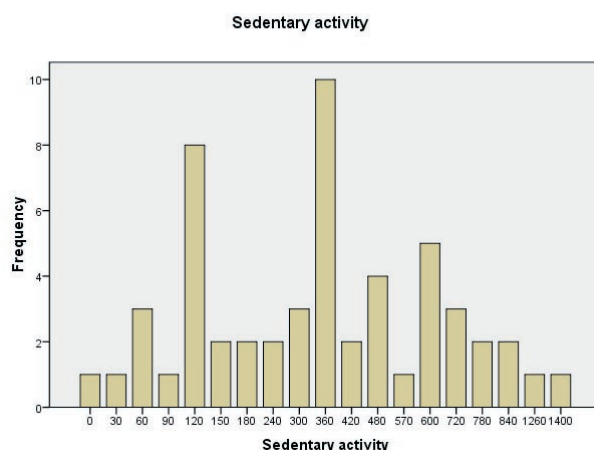
Study design: pilot project of descriptive cross sectional study

Results: There were 34 males and 20 females in the pilot project

The first table shows the mean standard deviation and minimum and maximum of values for each of the category of physical activity.

The first graph no.1 is a bar chart depicting work related vigorous physical activity against the frequency We can observe that of the 54, nearly 37 of students show zero Mets of work related physical activity

The graph 2 depicts work related moderate activity. Nearly 26 students were not engaged in moderate work related activity. The 2nd tallest is a bar showed 1440 Mets of moderate activity during college hours.

The 3rd graph depicted travel related activity.22 of the 54 were engaged in zero Mets of such activity.

The 4th graph depicted 32 subjects who show zero Mets of vigorous activity during recreation.

The 5th graph showed 25 subjects who show zero activity.

The 6th graph depicted total physical activity. Around 10 subjects showed zero activity

The last, 7th graph depicted sedentary hours. The tallest bar was at 360Mets with 10 students at 360mets per day. The second tallest bar was at 120 Mets with 8 students at 120 Mets.

DISCUSSION

Out of 54 students who completed the questionnaire, fourteen of them showed inadequate Physical activity. An inadequate physical activity is defined as those engaging in less than 75 minutes of vigorous physical activity per week or less than 150 Mets of moderate physical activity per week or less than 600 Mets of total physical activity in a week[11]. An inadequate physical activity is associated with obesity; diabetes mellitus type II and cardiovascular diseases, metabolic syndrome and hypercholesterolemia. The only solution for these students is that they should be encouraged to increase their physical activity

Graph 1 shows varying degree of physical activity. Thirty seven of the 54 students show zero Mets of work related vigorous physical activity physical activity .work related vigorous physical activity would mean the vigorous activity done in the college between 9am and 4 pm. Playing basket ball and cricket could be classified as moderately vigorous activity. We can observe from the second graph, that while 26 students engaged in zero Mets of moderate physical activity, the rest of the students were involved in moderate physical activity of varying time duration.

While travel related activity refers to walking or cycling from one place to another such as going from home to college and return and visiting place of worship, and so on. Observing third graph shows that twenty two students recorded zero Mets activity or in other words, twenty two of the 54 did not engage in travel related activity. The second highest bar depicts 9 students engaged in 840 Mets of travel related activity. The third tall bar showed 4 students engaged in 280 Mets. The maximum Mets of 5040 per week was done by 2 students.

Recreation related vigorous physical activity was not popular with the students. Thirty two students showed zero Mets activity. While the highest activity was 7200 Mets by 2 students, the minimum was 480 Mets other than those at zero Mets. Moderate intensity physical activity was not popular with the students while the highest level of moderate recreational physical activity was 84 Mets, 25 students were engaged in Moderate Physical activity at zero Mets.

Overall, we can say that physical activity was unpopular activity. Ranjit M et al in a large scale study, showed that a large percentage of people in India are inactive with fewer than 10% engaging in recreational physical activity. [12] This trend of inactive subjects as shown in the large scale study was similar to what we found in our pilot study.

Sedentary activity was shown by graph 7. The tallest bar was at 360 Mets for 10 students. The second tallest was 120 Mets by 8 students. The third tallest bar represented 600 Mets by 5 students and the fourth tallest bar depicted 480 Mets by 4 students. We should note that while physical activity assessed the activity of the past week, the sedentary activity assessed the sedentary hours on a typical day. As one hour of sitting on a particular day is equivalent to 60 Mets, and 6 hours of sitting equals 360 Mets, the high values of sedentary activity show a dangerous trend. We understand from the last graph, most students spent a large part of their day sitting at a place.

Limitations of The Study: This is a pilot project of a cross sectional survey. A larger sample size is expected to give a better picture.

CONCLUSION

A clear picture of high sedentary hours of I year medical students of BMCRI, shows a dangerous trend towards a sedentary lifestyle. Students should be made aware of the non communicable diseases associated with a sedentary lifestyle. They should be encouraged to engage in physical activity for a healthy future.

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Comparison of Serum Magnesium Levels with Body Mass Index and duration of Diabetes

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ABSTRACT

Aim: To evaluate serum magnesium levels in patients with type-2 diabetes and its association with BMI and duration of diseases.

Materials and Method: This study was carried out in the Department of Diabetology, Kilpauk Medical College on sixty type II diabetes patients without diabetic complications. Based on the duration of disease, diabetic patients were divided into Group - A (5 to 10 years of diabetic disease), Group -B (11 to 15 years) and Group – C (more than 15 years). Serum magnesium estimation was done by Colorimetric method with Chlorophosphonazo III in Hi - tech diagnostics, Chennai.

Results: The different parameters were analysed using ANOVA and Pearson correlation coefficient test. On comparing serum magnesium levels with BMI and duration of diabetes, the serum magnesium level decreases as the BMI and duration of diabetes increases.

Keywords: Diabetes Mellitus, Serum magnesium, Body mass index.

INTRODUCTION

Diabetes mellitus is a syndrome of impaired carbohydrate, protein and lipid metabolism. Hyperglycaemia results from defects in insulin secretion, its action or both, C. Ronald kahn et al [1] .Once it was a disease commonly seen in elderly and middle aged, but recent trend shows a rise in incidence of diabetes in younger age people. With improving socio economic status and industrialization in developing countries the incidence and prevalence of diabetes is also on a rising trend. Important factors influencing the development of diabetes in urban population include changes in dietary habit and modified sedentary life style. Current data reveals a large number of diabetic patients are there in our country and hence India is considered as Diabetes capital of the world. Insulin resistance is a part of a metabolic syndrome which includes Fasting hyperglycaemia, Hypertension, Obesity especially accumulation of abdominal fat and Lipid abnormalities which include decreased high-density lipoprotein-cholesterol and hypertriglyceridemia, Arthur c.Guyton et al[2]. All the features of the metabolic syndrome are closely related to deposition of excess adipose fat around the visceral organs.

As the body mass index increases the risk for diabetes also increases. Insulin sensitivity is affected by the distribution of body fat. Insulin resistance is more likely to be associated with central obesity than peripheral fat depots. Insulin resistance is present even in simple obesity without hyperglycemia, stating a fundamental abnormality of insulin signalling in states of fat excess.

Lipid accumulation in tissues such as liver and skeletal muscle impairs insulin signalling. Compared to lean individuals, obese persons have fewer insulin receptors in their adipose tissue, liver and skeletal muscle. Insulin-resistant states and obesity

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are associated with a substantially greater risk of developing type II diabetes.

Magnesium is an abundant intracellular cation. Magnesium content is high in metabolically active cell. About 80% of intracellular magnesium is bound to ATP and it acts as the substrate for various enzymes. Approximately more than 300 enzymes systems in our body require magnesium as a cofactor. It is required for enzyme substrate formation (for example Mg ATP). It also allosterically activate several enzyme systems, Carl A. Burtis et al[3]

MATERIALS & METHOD

The study was conducted in sixty cases of type II diabetes patients without diabetic complications. Both the sexes were included. Patients above 45 years were chosen for the study from the outpatients Department of Diabetology, Kilpauk Medical College Hospital. Ethical clearance was obtained. The subjects were briefed about the study and a written consent was obtained from them. Detailed history was taken and clinical examination was done. Height

is measured without shoes and body weight using standard weighing machine. BMI is calculated using the formula BMI = Weight in Kg / height in square metre. The lab investigations like Fasting Blood Sugar and urine routine was done in the Department of Diabetology, Kilpauk Medical College. The recommended and most preferred screening test is fasting blood sugar because it is less expensive and acceptable to patients. The most significant changes were the level of fasting blood sugar, that is recognized as diagnostic for diabetes, which was decreased from 140 to 126 mg/dl, Henry M.Kronenberg [4] .Serum magnesium estimation was done by Colorimetric method with Chlorophosphonazo III using cobas c 501 system in Hi tech diagnostics, Chennai.

RESULTS

Results were statistically analysed using ANOVA and Pearson's correlation coefficient. In our study, there were 30 females and 30 males patients, in the age group between 40 to 77 years with an average age of 57.9 years.

ANOVA

Table -1: Showing Mean ± SD of different variables

VARIABLES	GROUP-A n = 20	GROUP-B n = 20	GROUP-C n = 20	P-value
BMI	23.62 ± 4.11	26.32 ± 4.52	24.61 ± 3.01	0.09
FBS	140.1 ± 23.3	156.4 ± 28.3	164.7 ± 44.9	0.06
SERUM MAGNESIUM	2.06 ± 0.13	1.94 ± 0.12	1.83 ± 0.15	<0.001

Table-2 : Correlations of serum magnesium levels with BMI and fasting blood glucose.

S.NO	VARIABLES	Pearson's correlation 'r' value
1	BMI	
	Serum Magnesium	- 0.193
2	Fasting Blood sugar	
	Serum Magnesium	-0.027

On comparing BMI with serum magnesium levels there is a significant negative Pearson's correlation coefficient value of (r = - 0.193) that infers when the body mass index increases the serum magnesium level decreases. Similarly comparing Fasting Blood sugar with serum magnesium, there is a significant negative Pearson correlation coefficient value (r = - 0.027) that infers when the fasting blood sugar

level increases the serum magnesium level decreases. (Table-2).

Table - 3: Serum magnesium levels with duration of diabetes

Duration of the disease	No. of subjects	Mean ± Standard Deviation	P value
5-10yrs	20	2.060 ± 0.13	
10-15yrs	20	1.940 ± 0.12	
>15yrs	20	1.830 ± 0.15	<0.001

The mean serum magnesium levels for diabetic patients with duration of 5-10 years is 2.060 mg/dl, for 11-15 yrs it is 1.940 mg/dl, and for more than 15 years it is 1.830 mg/dl. On analysing the data by ANOVA, it is found that there exist significant differences among the 3 groups. These results confirm

that as the duration of diabetes increases the serum magnesium level decreases.

DISCUSSION

For the development of type 2 diabetes, low dietary magnesium intake may be an independent risk factor. This is supported by the Nurse's Health Study and the Health Professionals follow-Up study and they showed 33% lower risk in the development of diabetes in the subjects with highest quintile of magnesium intake than those in the lowest quintile of magnesium intake, Lecube Albert et al[5]. Hypomagnesemia usually signifies substantial depletion of body magnesium stores (0.5–1mmol/kg). Hypomagnesemia can result from defective renal tubular magnesium reabsorption; diarrhoea, rapid shifts of magnesium from the ECF into cells, bone, or third spaces, protracted vomiting and intestinal malabsorption. Dietary magnesium deficiency is unlikely except possibly in the setting of alcoholism. Agrawal et al[6] reported significantly higher fasting blood glucose levels in diabetics. Similar results were obtained in our study.

In our study there is a negative correlation between the BMI and Serum magnesium. Aibert lecube et al reported hypomagnesemia seen in obese subjects are related to the presence of diabetes and poor glycemic control rather than obesity itself. Naila Masood et al[7] reported gender related trace element levels in diabetics might be attributed to hormonal imbalance encountered in diabetes.

Mc.Nair et al[8] showed that hypermagnesiuria occurred in 55% of insulin treated diabetic outpatients, and is inversely correlated with fasting blood glucose and the rate of glycosuria. Reduced intestinal magnesium absorption secondary to higher fat intake and lower fiber intake in obese type 2 diabetic patients can cause low levels of magnesium. Diabetic autonomic neuropathy can potentiate hypomagnesemia by reducing oral intake and gastrointestinal absorption Thus it is observed that a strong association exist between serum magnesium levels and duration of diabetes. This finding was supported by study done by Sasmita Mishra et al.[9]

CONCLUSION

Diabetes mellitus is associated with lower levels of serum magnesium. Diabetes is the main factor accounting for low serum magnesium levels and it is related to degree of glycemic control. There is a significant association between serum magnesium levels and duration of diabetes. As the duration of diabetes increase serum magnesium levels decreases. Magnesium is a critically important micronutrient and useful therapeutic agent. So oral magnesium supplementation in diabetic patients with hypomagnesemia will improve insulin sensitivity and restore serum magnesium levels.

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Introducing Role Play in I MBBS- A Feedback

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ABSTRACT

The aim of this study is to evaluate the efficacy of the role play among Ist year MBBS students. Role play involves participation of a group of people where they assume the roles of characters and act out collaboratively to make understand the concept behind doing such plays[1]. The I MBBS course today is about 1 year duration. During this one year period the students have to rush through the three subjects -Anatomy, Physiology, and Biochemistry. In this short duration students should go through these subjects as well as need to get through too. To make learning easier we thought to introduce role play in between lecture classes. Role play refers to the changing of one's behavior to assume a role to act out an accepted role[2]. Role play is a didactic method of teaching where the students mind is engaged throughout the session[3]. After the sessions of role play, the students were given feed back forms and filled forms were taken for analysis. From the students feedback it is clear that role play not only maintains the attention span throughout the session but also helps them to learn the concepts well. More than 80% of them wish to have such sessions during their lecture classes.

Keywords: Role play, I -MBBS, Feedback.

INTRODUCTION

Teaching and learning go side by side. Teaching cannot go without learning.

Learning is the act of getting new knowledge or adding up or updating the existing knowledge, which helps to gain different types of information[4]. Learning theories are process of understanding where the information is grasped, processed, and retained during learning. Cognitive (the higher domain), emotions, and environmental factors, as well as past experience, all play a part during the process of understanding[5].

A teaching method should have the different types of methods used for teaching. Commonly used teaching method includes class participation, demonstration, recitation, memorization, or combinations of these[6]. Teaching is providing education to others. The person who provides it is called as a teacher. The teacher tries by various methods to give out his best of knowledge to his students. He tries hard to make them understand.[7].

There are various teaching and learning methods like Mass instruction (Conventional lectures, video presentations ,mass practical work), Individualized learning (Directed study of texts, study of open-learning materials, problem based learning{PBL}), Group learning (Class discussions; PBLs, seminars; group tutorials; games and simulations group projects; etc)[8].

Today the I MBBS course is about 1 year duration. During this one year period the students have to rush through the three subjects -Anatomy, Physiology, and Biochemistry. In this short duration students should go through these subjects as well as need to get through too.

To make learning easier we thought to introduce role play in between lecture classes in the process of our teaching. Role play is a teaching tool[9]. Role play refers to the changing of one's behavior to assume

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a role, either to fill a social role, or to act out an accepted role. While the Oxford English Dictionary offers a definition of role-playing as "the changing of one's behavior to fulfill a social role"[2]. There are many evidences that the students learn more from the role play than other teaching methods[9]. Role play is a didactic type of teaching[3]. Didactic is a kind of teaching where the students are involved and their minds are been engaged. Theory of didactic study is based on the knowledge that a student has, also to improve and deliver the concept[3].
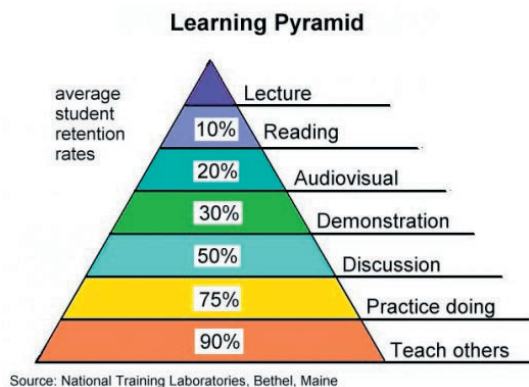
Role play can be simple or complicated, short or long duration but it should include the message that for what it is been acted out[9]. The teacher should keep up the time during the role play. There are many advantages of role play like it is a fun activity, the students participate actively, it simplifies a complicated concept and so on.

It increases the communication skills in the students and they work as a team together.

There is a Tuckman's (1965) framework for group task which has got four stages –Forming, Norming, Storming, Performing[9].

Forming: It is the duty of the teacher to facilitate it by introducing the purpose of the task as the students start to perform.

Norming: Here the group starts to perform by sharing their ideas. The teacher can help out them to clear their doubts about ideas and the rules and can also boost some more students to take participation.

Storming: This is the third stage where the student tries (rehearsal) to act out the role play.

Performing: In this stage the students finally performs the role play as a group together. The teacher has to facilitate, keep on encouraging them and also to see that the group is not been deviated from the topic or concept which they are supposed to act out.

MATERIALS & METHOD

This study was carried out during the physiology lecture classes with the students of

I MBBS of KAPV Government Medical College, Tiruchirapalli, Tamilnadu. After finishing the higher secondary schooling, the students as they enter I MBBS course find it difficult to cope up with the three basic subjects anatomy, physiology and biochemistry in one year duration. To make learning easier we introduced role play in between lecture classes. As per the senior students opinion central nervous system (CNS) was difficult for them to understand. We thought to make them understand CNS in an easy way, so gave the pathways such as pain and temperature, auditory pathway etc from CNS and special senses to the students for the role play. The topic for the role play was taken from the previous theory classes. The students were divided into various groups for each separate topic. The students practiced at hostel and a rehearsal was performed in front of the teacher before the final play. The students were allowed to implement their own ideas and to see that they bring out the learning concept behind the purpose of role play. The head of department (HOD) of physiology was the observer during the sessions. At the end, HOD gave the feedback to the students so that the next batch can perform in a better way. At the end of such sessions, the students were given feedback form and were asked to fill it up. The filled forms were assessed and discussed with the other faculties in the department of physiology.

From the feed back form the following things were assessed mainly like attention span, learning concepts, interesting and usefulness of role play. Results were expressed as percentage of the total students. Microsoft Excel 2003 was used for data analysis and expression of results.

Table1: Shows the feedback form obtained from the students

Questions asked	Yes	Moderate	No
Was it useful?			
Does it carried any importance towards learning			
Was your attention span present through out the role play			
Was it interesting?			
Does the role play made you to understand the concept?			
Do you want such role play to be implemented in your class lectures			

RESULTS

As per the feedback given by the students, it showed that the students wish to have role play in between lecture classes. The analysis showed that 67% of the students accepted that their attention span was continuous through out the session of role play (Fig 1).
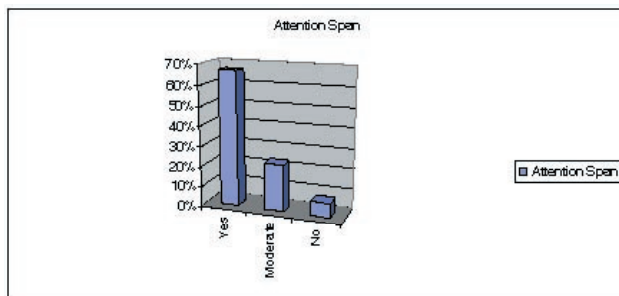
Fig 1: Bar Diagram showing students opinion regarding retention of attention span

Table 2: Showing the percentage of students opting for various aspects of role play

VARIABLE	YES	MODERATE
CONCEPT LEARNING	65%	31%
WISH TO HAVE	88%	8%

In the table 2 which shows that about 65% of the students opted that the learning of concept was easy and in a better way with the role play and also depicts that about 88% of the students prefer to have role play in their next lecture classes as their attention span was continuous through out the play and they were able to well understand the concepts.

DISCUSSION

Role playing is defined as acting out to be someone or acting out to be in a specific situation [2].Role *play is a method of teaching where the students learn easily the concepts.* Successful medical teaching needs that the teachers are able to understand the students needs and the differences in student's learning capacities and learning methods. Teaching in medical setting should have a balance between teaching and learning [10]. Earlier study done in community medicine showed that the role-plays are an effective teaching tool and can be introduced as a part of teaching methodology [11].

Role playing is derived from psychodrama that can be used to help students to understand the more complex aspects. Students become more interested and involved, not only they learn but also learn to reproduce the knowledge in action by exhibiting their talents and creative thinking [12].

From the results it is clear that more than 60% of the students accepted that their attention span was continuous throughout the session of role play and moreover the learning of concept was better with it. The students will be beneficial if we introduce the role play in between the theory classes.

CONCLUSION

Students in their busy schedule of learning first year subjects, the introduction of role play in between brought many changes in them. Students worked together as a group, communication skill developed in them in much better way, the student's hidden skill comes out and so on. More over the students had fun and enjoyment during the play.

From the results above it is clear that 67% of the students attention span was present through out the role play session and majority of the students accepted that the concept learning was better through the role play. Nearly 90% of the students have opted to have such role plays in the forthcoming classes. Hence we conclude that all the three domains psychomotor (skill), cognitive(knowledge) and affective(attitude) can be improved in students by introducing role play[9]. For the betterment of student's learning, role plays can be included in forthcoming classes as a teaching tool.

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Impact of Cigarette Smoking on Lipid Peroxidation and Atherogenic Indices in Asymptomatic Young Adults

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ABSTRACT

Background: Cigarette smoke contains numerous compounds, many of which are oxidants and prooxidants, capable of producing free radicals and enhancing the oxidative stress. It may promote atherogenesis by producing oxygen-derived free radicals that damage lipids. Increased lipid peroxidation play a significant role for causation of various diseases by oxidative damage and functional degeneration of the tissues. So, serum malondialdehyde (MDA), an indicator of lipid peroxidation and various atherogenic indices were measured.

Aim : To compare the serum malondialdehyde and atherogenic indices between smokers and non smokers and to establish relationship between lipid peroxidation and intensity of smoking.

Method: The study included 30 apparently healthy nonsmoker male volunteers ,30 light smokers and 30 heavy smokers with their age ranging from 25-35 yrs. Serum malondialdhyde was measured using Thiobarbituric acid assay and serum lipid profile were estimated using autoanalyser.Atherogenic indices namely Castelli's Risk Index l and ll ,TG/HDL and atherogenic coefficient were calculated.Statistical analysis was done using SPSS version 19. **Un paired student t test** was performed to compare the biochemical parameters between the groups. Pearson correlation analysis was done to establish relationship between two variables.

Result: The serum malondialdehyde level was significantly ($p < 0.05$) increased in smokers when compared with non-smokers .Serum lipid levels and atherogenic indices were also significantly ($p < 0.05$) increased in smokers.

Keywords: Smokers,oxidative stress, atherogenenic,malondialdehyde.

INTRODUCTION

Smoking has been introduced as fourth global health threat according to WHO[1]. Smoking is one of the most addictive habits, affecting the health of the individual. Most of the people usually associate cigarette smoking with breathing problems and lung cancer. But smoking is the second leading cause of CVD, after high blood pressure[2]. It contributes to cardiovascular morbidity and mortality[3,4]. Cigarrette smoke aggravates the various risk factors especially the alteration in lipid levels and generation of free radicals, for the development of premature or accelerated atherosclerosis. Each puff of cigarette smoke contains 10^{14-16} reactive oxygen species like superoxide, hydrogen peroxide, hydroxyl and peroxyl radicals [5]. These free radicals damage lipids, resulting in the formation of proatherogenic oxidized

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particles, specifically oxidized LDL [6]. Increased lipid peroxidation promotes atherogenesis. **The** various observational studies have yielded inconsistent results in the extent of lipid peroxidation in smokers and nonsmokers. Many studies have considered smokers in the age group of 40-50yrs [7].In this study young adult smokers within the age group of 25-35 yrs were involved with an intention to remove the confounding effect of age related alteration in lipid levels and oxidative stress.

The main objectives of this study was to compare the serum malondialdehyde (lipid peroxidation product) and atherogenic indices between smokers and non smokers and to establish relationship between lipid peroxidation and intensity of smoking.

MATERIAL & METHOD

This is a cross sectional study which was carried out in the department of physiology with the help of department of biochemistry.

The study included 30 apparently healthy nonsmoker male volunteers and 30 each light and heavy cigarrette smokers with their age ranging from 25-35 yrs . Smokers who smoked for more than 5 yrs were considered. They were further divided into light smokers if they smoked less than 10 cigarettes/day (n=30) and heavy smokers if they smoked more than 10 cigarettes/day(n=30). After getting institutional ethical clearance,informed consent was obtained.Fasting blood samples were collected. Serum malondialdehyde was measured using Thiobarbituric acid assay [8] and serum lipid profile were estimated using autoanalyser. Atherogenic indices namely Castelli's Risk Index l and ll, TG/HDL and atherogenic coefficient were calculated to assess their risk for atherosclerosis and myocardial infarction. The atherogenic ratios were calculated as follows[9]: Castelli's Risk Index (CRI-I) = TC/HDLc Castelli's Risk Index (CRI-II) = LDLc/HDLc Atherogenic Coefficient (AC) = (TC– HDLc)/HDLc

Inclusion criteria: Only males within 25-35yrs were involved in the study.

Exclusion criteria : Individuals who are obese , those with associated co morbid illness, on drugs for hypertension, diabetes, family history of lipid disorders. Those who are on antioxidants.

Statistical analysis was done using SPSS version 19. **Un paired student t test** was performed to compare the biochemical parameters between the groups. Pearson correlation analysis was done to establish relationship between two variables.

RESULTS

Table 1: Demographic profile of smokers and non smokers

	Non smokers	Smokers
Mean Age (years)	29.34+4.17	30.43+3.24
Mean BMI (kg/m2)	23.45 + 1.20	24.70+1.03

Table 2: Serum malondialdehyde levels in smokers and non smokers

	Non smoker	Smoker	p value
Serum MDA (nmol/ml)	1.68 ± 0.11	2.04 ± 0.25	<0.05

P<0.05 - significant

Table 2a: Serum malondialdehyde levels in Light smokers and Heavy smokers

	Light smoker	Heavy smoker	p value
Serum MDA (nmol/ml)	1.92± 0.20	2.12± 0.29	0.08

P<0.05 - significant

Table 3 : Estimation of serum lipid and atherogenic ratios in smokers and nonsmokers

	Non smokers	Smokers	P value
TC (mg/dl)	176.40 ± 26.31	190.12 ± 32.20	<0.05
TG (mg/dl)	126.35 ± 11.74	142.66 ± 29.5	<0.05
LDL (mg/dl)	108.10 ± 8.84	130.12±15.58	<0.05
HDL (mg/dl)	45.60 ± 2.56	39.36 ± 2.35	<0.05
TG/HDL	2.1 ± 0.54	3.78 ± 0.57	<0.05
TC/HDL	3.6 ± 0.26	4.86 ± 0.21	<0.05
LDL/HDL	2.80 ± 0.57	4.34 ± 0.48	<0.05
Atherogenic coefficient	3.10± 0.37	4.38 ± 0.56	<0.05

P<0.05 - significant

Table 3a: Estimation of serum lipid and atherogenic ratios in Lightsmokers and Heavy smokers

Lipid levels	Light smokers	Heavy smokers	p value
TC (mg/dl)	182.12 ±24.30	196.10 ± 44.14	p =0.05
TG (mg/dl)	137.22 ±29.01	148.10 ± 30.06	p =0.07
LDL (mg/dl)	126.22±11.03	132.56 ±18.30	P=0.26
HDL (mg/dl)	41.44 ±2.34	37.28 ± 2.56	P =0.06
TG/HDL	3.45 ±0.61	4.10 ± 0.52	P = 0.12
TC/HDL	4.48 ±0.32	5.23 ±0.12	P= 0.09
LDL/HDL	3.68 ± 0.65	4.96 ± 0.31	P=0.27
Atherogenic coefficient	4.07 ± 0.54	4.72± 0.61	P=0.58

P<0.05 – significant

Table:1   shows the demographic profile of all male subjects .Individuals between the age group of 25-35 yrs and with normal BMI were involved.

Table :2 represents significant increase in serum malondialdehyde levels among smokers.Table: 2a determines that   MDA levels in heavy smokers are increased but   not to the significant level when compared to light smokers.

Table :3 indicates significant differences in lipid profile and atherogenic indices among smokers and non smokers.Table :3a suggests ,though there was increase in lipid levels and in atherogenic indices level in heavy smokers when compared to light smokers,it was not to the significant level.

Pearson correlation analysis was done and found to have weak positive correlation between the smoking intensity and MDA levels (r=0.32),Atherogenic indices level(r=0.24)

DISCUSSION

Impairment in the oxidant and antioxidant equilibrium provokes a situation of oxidative stress and it generally results from hyper production of free radicals. Cigarette smoke is a potent source

of free radicals [10]. It also stimulates the alveolar macrophages to release much more of free radicals [11]. Lipids,which are the major targets of free radical attack, undergoes lipid peroxidation.Increased lipid levels in smokers Malondiaidehyde is an indicator of lipid peroxidation.

There have been conflicting findings regarding the extent of lipid peroxidation in smokers.In this present study, the MDA levels were significantly elevated in smokers reflecting the elevated state of oxidative stress. This is well in agreement with the findings of study carried out by Pasupathi et al et al and others [12]. Lykkesfeldt et al observed high plasma MDA levels in smokers[13]inspite of balanced antioxidant status.This indicates smoking enhances lipid peroxidation. On the contrary a study carried out by Risal et al[14] found no difference in MDA levels between smokers and non smokers

Lipid levels are adversely affected in the smokers.Smoking raises the level of total cholesterol, LDL,TG and decreases the level of HDL. These observations are similar to those observed by Freeman etal [15]and others[16,17].

Nicotine, one of the addictive constituents of tobacco smoke has a considerable influence on increasing the lipid levels in blood. It alters lipid levels in smokers by increasing catecholamine secretion by adrenal system which results in increased lipolysis and raised concentration of plasma free fatty acids (FFA) which further result in increased secretion of hepatic FFAs and hepatic triglycerides in the blood stream. [18,19] Smoking causes an increased activity of HMG-CoA reductase [20] and decreased lipoprotein lipase [21]activities. Nicotine also increases the circulatory pool of atherogenic LDL via accelerated transfer of lipids from HDL and impaired clearance of LDL from plasma compartment thereby increasing the deposition of LDL cholesterol in the arterial wall[22].

It is known that hyperlipidemic state alters the physical properties of cellular membranes [23], leading to increased production of lipid peroxidation products like MDA. The serum triglycerides and smaller denser LDL particles are substrates that are more susceptible to peroxidation[24].

Hypercholesterolemia is associated with oxidative modification of LDL, protein glycation, glucose- autooxidation, thus leading to excess production of lipid peroxidation products mainly MDA which cause oxidative stress[25,26].

Various studies indicate that oxidatively modified LDL is an important contributory factor for development of atherosclerosis.It is taken up by macrophages to form foam cells and aggravate the process of atherosclerosis [6,7].

The various indicies are of great value for detecting atherogenic risk.Castelli's Risk index (CRI) depends on three important lipid profile parameters i.e. TC, LDLc and HDLc. CRI-I calculated as the ratio of {TC/HDLc} and CRI-II as {LDLc/HDLc} [9], These indices were found to be significantly higher in smokers when compared to nonsmokers. This finding is in accordance with the study done by kaori etal[27].

There was no significant difference between light and heavy smokers.The probable reason would be due to usage of filtered cigarettes by majority of the heavy smokers. The filtered cigarettes reduces the amount of toxic substances being inhaled by the smokers.So,weak correlation was established between the intensity of smoking and the various atherogenic indices and MDA levels. Even the usage of filtered cigarettes elevates lipid levels ,MDA levels and also the atherogenic indices level.

Both these indices have been suggested to be the most important predictor of premature development of coronary heart disease [28]. Many studies have not considered these ratios in analysing the atherogenic risk status among smokers.The significance of TC/HDL is that it is more sensitive and specific index of cardiovascular risk than total cholesterol [29]. It has been shown to be a good predictor of carotid intima-media thickness; it has greater power than the isolated variables and similar power to that of the apoB/apoA-I ratio and non-HDL cholesterol [30].

TG/HDL ratio which is the best predictor of heart disease was found to be significantly increased. This finding is well in agreement with the study carried by Pusapati etal [31] . The ratio of TG to HDLc is a strong predictor of infarction [32].Atherogenic Coefficient (AC) is found to be significantly elevated among smokers which reflects their raised atherogenic potential of the entire spectrum of lipoprotein fractions[33].

CONCLUSION

Cigarette smokers have higher levels of lipid peroxidation suggesting that the pro atherogenic effects of smoking are mediated by oxidative damage induced by lipid peroxidation. This would convince young smokers to quit smoking habit. Even the filtered cigarette brings about hazardous effect

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A Study on Gender Variation of Pain Thresholds

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ABSTRACT

Background: Pressure pain threshold (PPT) is defined as the minimum force applied which induces pain. Disturbance of sensory function can be a major feature of neurological illness. Objective measurement of the nature and degree of sensory disturbance is needed to understand and characterize the disorder. Among the many sensory modalities pain is the one which attracts the patient to the physician. Pain is a complex sensory experience. Decrease in pain thresholds, increase in magnitude of sensation is useful for the clinician and researcher.

Objective: To evaluate gender differences of pain thresholds.

Materials& method: Forty five healthy males & forty five females in the age group of 18 -22 years were included for the study. Informed consent & IEC was obtained. Pain threshold was measured by digital pressure algometer. Subjects were instructed to indicate when the pressure sensation begins to hurt, and they first feel pain, which was noted as the pain threshold. Pain thresholds were measured at different areas. Mean of such six were points was considered as Pain threshold.

Results: The pain thresholds were significantly higher in men (3.02 ± 0.31) kg/cm^2 as compared to women (2.51 ± 0.26) kg/cm^2 $(p<0.05)$.

Conclusion: Pain thresholds in men were higher as compared to women. Pain thresholds can be determined by Digital Algometer, which is simpler, less time consuming, economical, easier to apply and non-invasive method. Pain threshold is a useful parameter for assessing response to the treatment, but not useful in diagnosis or even as a screening method.

Keywords: *Pain threshold, Algometer, Gender difference.*

INTRODUCTION

Pain is a complex sensory experience. Disturbance of sensory function is a major feature of neurological illness. Objective measurement of the nature and degree of sensory disturbance is needed to understand and characterize the disorder. Quantification of sensory function can be used to detect disruption of sensory pathways and modify the course and treatment at all levels of the nervous system. Among the many sensory modalities pain is the one which attracts the patient to the physician. Decrease in pain thresholds, increase in magnitude of sensation is useful for the clinician and researcher in evaluation of neurological diseases.

Pressure pain threshold (PPT) is defined as the minimum force applied which induces pain. Instrument used to quantify pain sensation is Algometer, used by Head and Holmes to measure pressure pain[1]. Green and Swets described the methods for threshold detection[2]. These methods are

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now recognized as valuable in testing sensory function and examining the integrity of the small nerve fibers which are not examined by nerve conduction studies. Thus, the recent decade has provided a flurry of reports on the clinical use of quantitative sensory testing (QST) in diagnosis, follow-up and evaluation of therapy for many clinical entities. The main clinical applications seem to be the neuropathies and pain-centered disorders.

For clinical purposes, threshold is the function that can most easily and conveniently be measured in non-painful modalities. There are no significant gender differences in non-painful sensory modalities. Gender differences in response to noxious stimuli have been explored extensively. Hence the current study is designed to estimate gender differences of pain thresholds.

MATERIALS & METHOD

The study was conducted in a sample of forty five healthy male subjects and forty five healthy female subjects in the age group of 18-38 years were included for the study. Informed consent was taken from all the participants who volunteered for the study. The study was approved by Institutional Ethical Committee, Vinayaka Mission's Kirupananda Variyar Medical College, Salem.

Inclusion criteria:

1. Ninety healthy subjects of both sex between 18 and 38 years.

Exclusion criteria:

1. History of consumption of alcohol/smoking.

2. History of depressive disorders in the past.

3. History of sleep disorders

4. Hypertension

5. Diabetes mellitus

6. History of consumption of drugs acting on CNS

Cross Sectional Study design: The subjects were selected by a detailed history & thorough physical examination.

Pain threshold was measured using in house built Pre calibrated Digital Algometer. Pain thresholds were measured by delivering gradually increasing pressure stimuli. The pressure at which subject perceives it as pain stimuli will be noted by the change in expression & instructed the subject to raise the hand when he perceives pain. Pain thresholds were measured at different sites. Mean of such six sites was considered as Pain threshold.

STATISTICAL ANALYSIS

The results were expressed as mean ± standard deviation (SD). A p value of <0.05 was considered statistically significant. Statistical analysis was performed using the statistical package for social & sciences. Students unpaired 't' test was applied to compare between the parameters.

RESULTS

Pain thresholds were estimated in forty five healthy men (19.42± 1.27) years & forty five healthy women (19.06± 1.01) years in the age group of 18-38 years (Table 1). Pain thresholds in men (3.02 ± 0.31) kg/cm^2 were significantly higher at 95% confidence interval than women (2.51 ±0.27) kg/cm^2, p < 0.001. The results are shown in the table 2.

DISCUSSION

Pressure algometers are advantageous for quantifying the pressure pain thresholds. Algometer is used for the evaluation of pain, determination of therapeutic effects, and follow up surveys of treatment in many neurological & musculoskeletal diseases. Digital pressure algometers have now become standard, and computer-controlled pressure algometers are currently being developed. Pressure pain thresholds measured by pressure algometry may produce different results depending on many factors as sex, investigator, and apparatus.

Many studies have revealed the difference in pressure pain threshold between men and women. Most of these studies reported higher pressure pain thresholds in men than in women.[3-8] The similar results were obtained in our study also. The reason for the difference may be that men tend to respond to pain more slowly than women because of the traditional social recognition that men must endure

pain. The exact reason has yet to be determined. Considering the principle of pressure algometry, in which pain is induced by applying a force to a muscle and is recognized by a subject, the thicker muscle and subcutaneous tissues of men in view of anatomical characteristics may also affect the results of the studies. In actuality, men may be less susceptible to pain than women due to physiological characteristics. Further studies are required to test this hypothesis. The reasons of high pressure pain sensitivity in females remain unknown. Many factors e.g., stress, physical, or psychological may contribute to abnormalities in muscle & peripheral nerve tissue, sleep, and neuroendocrine axis. The abnormalities would lead to rise of nociceptive transmission from the periphery to the dorsal horn as well as the stimulation of substance P production.[9-11] Fillingim and Maixner reviewed 34 human experimental studies examining possible sex differences in responses to induced noxious stimulation.[12] Fowler et al found gender differences for threshold; particularly the threshold for perception of warming on the soles of the feet was considerably higher in men than in women.[13] Doeland et al found gender differences for threshold; men had higher thresholds for warm and cold.[14] Fillingim & Glass et al found Women are also more likely than men to have recurrent pain due to reproductive cycle. Sociological researches have shown that gender variation can be affected by employment status, psychological distress, degree of happiness, and role obligations.[15, 16]

Table 1: Distribution of Study subjects by Age & Sex

Age in years	Males	%	Females	%	Total	%
18	14	15.6	14	15.6	28	31.2
19	11	12.2	20	22.2	31	34.4
20	10	11.1	6	6.7	16	17.8
21	7	7.8	4	4.4	11	12.2
22	3	3.3	1	1.1	4	4.4
Total	**45**	**50**	**45**	**50**	**90**	**100**

Table 2: Comparison of pain thresholds between males and females

	Males	Females	p
Pain Threshold Kg/cm^2 (Mean ± SD)	3.02 ± 0.31	2.51 ±0.27	< 0.01

CONCLUSION

1. There is increase in pain thresholds in males compared to females.

2. Pain thresholds can be determined by Digital Algometer; is simpler, less time consuming, economical, easier to apply and non-invasive method.

3. Pain threshold is a useful parameter for assessing response to the treatment.

4. But not useful in diagnosis or even as a screening method.

5. Quantification of sensory function can be used to detect disruption of sensory pathways at all levels of the nervous system.

Scope of the study: Further study can be extended in various phases of menstrual cycle.

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

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A Prospective Outlook of Yogic Training on Lung Functions and Antioxidants Status

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ABSTRACT

Stress leads to production of free radicals in animal muscle. Antioxidant enzymes act directly or indirectly to remove reactive oxygen species and thus elevation of these enzymes with training, suggests an increased need for protection against free radicals. Thirty healthy participants were trained for yogic exercise for a period of 6 months and their forced expiratory volume in first second, forced vital capacity and peak expiratory flow rate were assessed. Biochemical investigations were also performed to assess MOD and SDA level. Exercise has a positive effect on respiratory functions. Such a practice leads to an increase in resting tidal volume, decrease in respiratory rate, increase in vital capacity and breath holding time.

Keywords: *FEV$_1$, FVC, PEFR*

INTRODUCTION

The living beings are continually exposed to reactive oxygen species (ROS). Such a challenge comes from external noxious sources such as ionizing radiations, toxic drugs, chemicals, and environmental pollutants. The living cell is also capable of generating reactive oxygen species by itself and some cell types are ever specialized to do so[1]. Strenuous exercise is known to stimulate catecholamine secretion in circulation[2] which could potentially generate free radicals in the body either through auto-oxidation or through metal ion or superoxide catalyzed oxidation[3].

The superoxide radicals thus generated lead to the formation of H$_2$O$_2$ and highly reactive hydroxyl OH* radicals in the presence of copper and iron [3,4]. Any reduction in the level of Super Oxide Dismutase (SOD) invariably leads to an impaired protection against the toxic effects of O$_2$* and this might lead to severe cellular damage[5].

Lipid peroxidation is an autocatalytic free radical process [6]. Lipid peroxidation (Malonaldehyde formation) was shown to be increased by an acute bout of exercise in hepatic mitrochondria of untrained rats. The authors suggested that antioxidant enzymes in liver and skeletal muscle are capable of adapting to exercise to minimize oxidative injury caused by free radicals [7].

Lipid peroxidation in terms of malondialdehyde (MDA) expression also increased with exercise. Aging is accompanied with an elevation of antioxidant enzymes activities and lipid peroxidation in skeletal muscle probably due to the increased oxygen free radical production and reaction[8].

Yogic exercises have been known to increase mental and physical control of the body, affects the union of soul with universal spirit. Earlier, practices of Yogasan and Pranayam have revealed physical and mental well being. Yoga has great therapeutic potential in management of related diseases stress. The present study was undertaken to assess the free radical status and pulmonary functions in response to yogic exercise.

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MATERIALS & METHOD

A prospective study was conducted in the physiology and biochemistry department of a teaching hospital. Written consents were obtained from the participants included in this study. Thirty participants practicing yogic exercise, mean age group between 18-30 years were selected after taking a detailed personal, medical and family history. Participants with hypertension, diabetes and history of addiction, respiratory or cardiovascular diseases were excluded from the study. Participants were asked for practicing yogic exercise daily for 30 minutes in morning session. Pranayama was performed in three forms: Shavasana, Bhastrika and Surya Anulome Vilome. After the session, participants practiced meditation (Dhyana) and concentration (Dharana) in various ways i.e. Padmasana, Sukhasana, Savasana and Raja yoga (state of 'Nirvana' or 'Super Consciousness').

5 ml blood sample from each participant was drawn for biochemical estimation of malondialdehyde, super oxide dismutase and free radicals. The parameters adopted for pulmonary tests were FEV_1 (forced expiratory volume in first second), FVC (forced vital capacity) and PEFR (peak expiratory flow rate) and recorded periodically at the regular interval of 0, 3, and 6 months. Pulmonary function test was done using the medspiror spirometer. All the reagents used were procured from sigma Co. Ltd. St Lewis USA and were of purest analytical grade.

Biochemical investigations

Biochemical estimation of Plasma MDA was done using modified method by Ohkawa et al, [9] whereas Super oxide dismutase (SOD) was determined by the modified method of McCord and Fridovich [10].

Statistical Analysis was done using Student's paired t – test. ANOVA (Analysis of variance) was performed to compare different groups and to assess the significance of the comparison.

FINDINGS

A significant increase was observed in FEV_1 (p<0.001) in first three months however changes were insignificant in FEV_1 at 6 months. A significant increase was noticed in FVC at 3 months. PEFR was significantly increased from beginning of training to 3 months of training. Thereafter changes were insignificant in the duration of 3- 6 months (Table -1).

The SOD was 11.23±0.39 at the beginning of the exercise, 13.09±0.14 after 3 months and 14.15±0.36 after 6 months. it was observed that SOD significantly increased in yogic exercise from beginning of training to 3 months of training (p<0.001).

A significant change was noticed in MDA level in yogic exercise after 3 months of training. But changes were not significant during 3 to 6 month training. The MDA was 9.52±0.11, 8.16±0.15, 7.47±0.28 at the beginning, after 3 and 6 months respectively.

DISCUSSION

The present study was conducted to evaluate the effect of yogic exercises on pulmonary functions and on the antioxidant status after exercise.

Our findings supports the findings of Makwana et al [11] who made a similar report of increase in FVC following 10 weeks of yoga. The mean FVC changed from 2799.73 ml to 3310.88 ml (P<0.05). The improvement of FVC is due to increase in power and endurance of respiratory musculature incidental to regular practice of yogic exercise [12]

The lung inflation near the total lung capacity is a major physical stimulus for release of lung surfactant [13] and prostaglandins [14] which may increase the lung compliance and decrease the bronchial smooth muscle tone respectively.

Alexander et al [15] reported 11% increase in PEFR in patients given only relaxation therapy for bronchial Asthma. Change in FEV_1 with yoga was shown to be from 255.93 to 2955.87 ml (P<0.005) by Makwana et al [11]. Moreover, a significant increase in FVC and PEFR (P<0.05) has been reported by Joshi et al [16]. Practice of yoga reduces the emotional disturbances there by modifying the airway resistance in easy breathing and well being of the patients [17]. The yogic kriya brings about cleaning of inner tracts and desensitization of the nerve endings. It has been documented that inflammatory mediators such as air pollution activate sensory nerve endings in the airways causing cough, chest tightness and broncho constriction [18].

In present findings SOD level was 11.23±0.39 at the beginning, 13.09±0.14 after 3 months and 14.15±0.36 at the end of sixth months. The MDA was

9.52±0.11, 8.16±0.15 and 7.47±0.28 at the beginning, after 3 and 6 months respectively.

Practice of yogic exercise by regulating the oxygen intake down regulates the lipid peroxide production and increase the activity of Super oxide dismutase level. This has been the finding of the present study. Different methods to detect lipid peroxidation used in previous studies have led to inconsistent reports and problems in confirming the relationship between lipid peroxidation and exercise. There is no single biomarker that is best at assessing lipid peroxidation, especially during exercise.

Practice of yoga help in de-stressing a person and better adapted to external stressor stimuli. The production of MDA is due to lipid peroxidation which by itself takes place due to OH* production. The generation of OH* in turn is secondary to increased production of O*. This free radical is produced secondary to various stimuli - biological, chemical and environmental These stimuli include any form of stress to the biological system The stress can be physical or mental (19). Perhaps control of breathing by decreased oxygen utilization causes increase in SOD.

CONCLUSION

The Malondialdehyde decreaseswit yogic exercises viz: pranayama and meditation. A Practitioner of pranayama tries not only to breath out but at the same time tries to keep his attention on the act of breathing, leading to concentration. This act of concentration removes his attention from worldly worries and 'de-stresses' him. This stress free individual is able to adapt better to the daily emotional, physical and mental stresses. In essence if we bring down the stress level of an individual, the free radical production also goes down. Practice of Yoga strives towards this direction. The decrease in lipid peroxide level following training and increase in the activity of the enzyme SOD proves this point. Present study has shown practice of yoga de-stress the individual by reducing the level of MDA.

Table: 1

Duration	Parameters measured during Yogic exercise		
	FEV$_1$ (litres)	FVC (litres)	PEFR (litres/ minutes)
Baseline	3.01± 0.19	3.15±0.13	9.77± 0.57
3 months	3.18± 0.98	3.30±0.11	11.46± 0.22
6 months	3.32± 0.81	3.48±0.29	12.35± 0.58

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Cognitive Function Across the Menstrual Cycle of Young Healthy Women

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ABSTRACT

Aim: To assess the status of cognitive function across the different phases of menstrual cycle and to empirically evaluate the role of hormones and their interaction among young healthy women.

Material and Method: 60 Subjects who ranged in age between 17 to 25 years were tested three times: (a) Menstrual phase (MF) (b) Mid-luteal phase (ML) and (c) Ovulatory phase (O phase). The O phase was included to differentiate between the independent influences of estrogen and progesterone on cognitive function. To confirm the date of ovulation, ELISA-based LH urinary strips were used. The tests were administered usually in a single sitting of 60-90 min duration. Assessment of verbal, visual and working memory were carried out with Rey's Auditory Verbal Learning Test (RAVLT), Rey's complex figure test (CFT) and Wechsler Memory Scale (WMS)-digit and spatial span respectively.

Results: Highly significant statistical difference in scores of RAVLT- Total score, RAVLT- Average-score, RAVLT- Immediate recall & RAVLT-delayed recall when Menstrual phase, Ovulatory phase and Mid-luteal phase of menstrual cycle were analysed using Repeated Measure ANOVA. Similar observation was made in case of CFT-Copy, CFT-3minutes, CFT-30minute, Spatial span backward, digit span forward and digit span backward.

Conclusion: After analysing our result and comparing it with the work of the other researchers we the authors are of conclusion that it will be premature to comment upon the type of influences the hormone play on cognitive function across the menstrual cycle. We need further in-depth analysis using amalgam of recent as well as old techniques of evaluating cognitive function to come upon any conclusion.

Keyword: *Cognition, Menstrual cycle, Estrogen, Progesterone.*

INTRODUCTION

The menstrual cycle can be divided in a follicular and a luteal phase: the follicular phase is used generally to refer to the period after completion of menses until ovulation.[1] During menses and early in the follicular phase, levels of both progesterone and estrogen are very low, while toward the middle and later portions of the follicular phase estrogen levels begin to rise. [2] During the luteal phase, the period between ovulation and menses-onset, estrogen levels decrease to a moderate level until they fall sharply just before the onset of menstruation. Progesterone level rise after ovulation, peak at the mid-luteal phase, and fall rapidly just before menstruation . [1, 2]

Recently researchers are of view that fluctuation of these two hormones also plays a pivotal role in neurological and psychological development and function which impacts brain function and cognition.

The estrogen receptors spread throughout the brain—hypothalamus, pituitary, hippocampus, cerebral cortex, mid-brain, and brainstem.[3] Estrogen acts on the central nervous system on a variety of

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levels, directing and modulating neurotransmitter production and action, influencing electrical excitability and synaptic function, and changing the morphological features of neural elements involved in function. [4] Estrogen has been demonstrated to affect numerous neurotransmitter systems, including the dopaminergic, catecholaminergic, serotonergic, cholinergic, and gamma-aminobutyric acidergic systems .[3,5] Because of the widespread influences of these various neuronal systems, ovarian steroids may have measurable effects on cognition. E2 receptor beta (ERβ) is thought to mediate cognitive rather than reproductive processes and appears to be the main ER subtype. [6, 7, 8] Functional neuroimaging studies of women while undergoing specific cognitive tasks have demonstrated an association between tested cognitive functions and specific activated brain regions. [9] It has also been demonstrated that E2 modulates the structure and function of the dorsal hippocampal formation, an area of the brain that governs memory and learning. [10]

The effects of Progesterone on the brain are less known. Progesterone receptors (PR) have been found in the frontal cortex where its metabolites pregnanolone and allopregnanolone bind to the GABA-A receptor complex, potentiating GABAergic inhibitory mechanisms. [11, 12, 13, 14]. Studies suggest that Progesterone could play an important role in facilitating cognition .[15, 16]

Thus the menstrual cycles offers a unique opportunity to study whether subtle fluctuations of sex hormones can influence neuronal circuits implicated in cognitive regulation.

The purpose of this study was to determine the effect of sex hormones on cognitive abilities under three different hormonal milieus and in what manner these hormonal changes influence cognitive performance:

1. When both estrogen and progesterone levels are low

2. When estrogen level is high & progesterone level is low

3. When both estrogen and progesterone levels are high

MATERIAL & METHOD

The study was conducted in the Department of Physiology, IGIMS Medical College Patna.

Inclusion criteria:

60 Subjects who ranged in age between 17 to 25 years were included in the study. Young medical students, an intellectually homogenous group participating in this study, were tested three times: (a) during low estrogen and progesterone level (Menstrual Phase) (b) when the estrogen and progesterone levels were high (ML phase - midluteal phase) and (c) in the ovulatory phase (O phase), when the estrogen level is the highest and progesterone is low. The O phase was included to differentiate between the independent influences of estrogen and progesterone on a single cognitive function.

The study sample was limited to the students with a regular menstrual cycle of 28 to 30 days length in order to make the phases more precisely definable in the absence of hormonal measurement; ovulation occurs almost exactly 14 days prior to the next menstruation onset, irrespective of cycle length.

Exclusion Criteria:

-Taking oral contraceptives, or other type of hormonal therapy

-History of menstrual abnormality

-Subjects with neurological disease, depressive disorder, psychosis, anxiety, severe hearing and visual impairment were excluded from the study

Test sessions

Cognitive tasks were performed in three different phases of the menstrual cycle: (a) from the 2nd to the 4th day of the menstrual cycle in the Menstrual phase (b) in the Ovulatory phase, and (c) 7 to 9 days post ovulation in Midluteal phase (ML) phase. To confirm the date of ovulation, ELISA-based LH urinary strips were used.

Each test session was performed at the same part of the day to avoid circadian rhythm changes. The study was conducted during non exam period. They had not taken medication, caffeine and alcohol within 24 hour of the experiment.

Neuropsychological battery

The tests were administered usually in a single sitting of 60-90 min duration. Assessment of verbal, visual and working memory were carried out with Rey's Auditory Verbal Learning Test (RAVLT), [17] Rey's complex figure test (CFT) [18] and Wechsler Memory Scale (WMS) -digit and spatial span [19] respectively.

The Rey Auditory Verbal

Learning Test (RAVLT) [17] assessed verbal memory and learning. Participants were read a list of 15 common words five times. Immediately after each time, they were required to recall as many words as possible. After the fifth trial, an interference list was presented, after which participants had to spontaneously recall the original words. Finally, participants were required to spontaneously recall the original words after a 20 minute delay. Scores were calculated as the total number of words recalled (1) across the five trials (total acquisition); (2) after the interference list (recall after interference); (3) on the fifth trial minus after the interference (loss after interference); and (4) after the delay (long delay free recall).

Rey's complex figure test (CFT)

The **Rey-Osterrieth Complex Figure Test** (ROCF) is a neuropsychological assessment in which examinees are asked to reproduce a complicated line drawing, first by copying it freehand (recognition), and then drawing from memory (recall). Many different cognitive abilities are needed for a correct performance, and the test therefore permits the evaluation of different functions, such as visuospatial abilities memory, attention, planning, and working memory(executive functions).

WMS-digit and spatial span

WMS digit span test included verbal repetition of the series of digits in forward and backward order. WMS spatial span test is a visual analogue of digit span test, which included tapping of prearranged blocks in forward and backward sequence

Statistical Analysis

All the data values was presented as Mean ± SD were analysed by One way ANOVA Repeated Measure followed by post hoc analysis for testing differences between the various phases of menstrual cycle. The level of statistical significance was determined at $p < 0.05$.

Table 1: Scores achieved on tested cognitive task during different phases of Menstrual Cycle

Cognitive Test	Menstrual Phase	Ovulatory Phase	Midluteal Phase	p-Value
RAVLT-Total Score	26.88±4.02	45.80±7.31	44.007.07	<0.000
RAVLT-Average Score	5.60±0.86	9.64±2.70	9.84±2.77	<0.000
RAVLT-Immediate Recall	5.92±1.11	7.72±2.42	7.84±2.47	<0.000
RAVLT-Delayed Recall	6.8. ±1.32	10.48±1.80	10.64±2.01	<0.000
CFT-Copy	27.32±2.53	31.64±5.99	32.76±6.22	<0.000
CFT-3 Minutes	10.08±2.50	11.44±2.60	10.24±2.50	<0.000
CFT-30 Minutes	8.36±0.99	12.92±3.06	11.32±2.54	<0.000
Spatial Span-Forward	7.36±1.11	7.48±1.61	7.24±1.16	NS
Spatial Span-Backward	4.76±1.45	5.92±1.28	5.68±1.40	<0.000
Digit Span-Forward	4.84±0.80	6.24±1.23	5.84±1.17	<0.000
Digit Span-Backward	4.32±0.90	6.84±1.40	6.64±1.31	<0.000

One way ANOVA Repeated Measure was applied for analysis Intragroup comparison

NS: Not significant, P<0.05, P<0.01: highly significant, P<0.001; very highly significant

Table 2: Illustrates the result of post hoc analysis of cognitive task during different phases of menstrual cycle

	RAVLT-Total Score	RAVLT-Average Score	RAVLT-Immediate Recall	RAVLT-Delayed Recall	CFT-Copy	CFT-3 Minutes	CFT-30 Minutes	Spatial Span-Forward	Spatial Span-Backward	Digit Span-Forward	Digit Span-Backward
MF Vs OP	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	NS	<0.000	<0.000	<0.000
OP Vs ML	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MF Vs ML	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	NS	<0.000	<0.000	<0.000

NS: Not significant, P<0.05, P<0.01: highly significant, P<0.001; very highly significant

RESULTS

Table I shows a highly significant statistical difference in scores of RAVLT- Total score, RAVLT-Average- score, RAVLT- Immediate recall & RAVLT-delayed recall when menstrual phase, Ovulatory phase and Mid luteal phase of menstrual cycle were analysed using Repeated Measure ANOVA. After analysis of variance, we used post hoc analysis (Bonferroni test) for finding out differences between the various phases of the menstrual cycle if any. On Post hoc analysis it was observed that there was no statistically significant difference between ovulatory phase and midluteal phase but statistically significant difference was observed between menstrual phase when compared with Ovulatory phase and midluteal phase.

Similar observation was made in case of CFT-Copy, CFT-3minutes, CFT-30minute, Spatial span backward, digit span forward and digit span backward.

DISCUSSION

The purpose of this study was to determine the effect of sex hormones on cognitive abilities under three different hormonal milieus and in what manner these hormonal changes influence cognitive performance.

In the present study we assessed the effect of three phases of menstrual cycle on cognitive domain such as visuospatial abilities, memory, attention, planning, and working memory (executive functions). Our result shows statistically significant increase in scores of RAVLT, CFT, Spatial Span and Digit span when menstrual phase was compared with ovulatory and midluteal phase indicating better cognitive abilities during later phases of menstrual cycle. But no statistically significant difference was observed between ovulatory and midluteal phase suggesting that progesterone per se doesn't affect cognitive function.

Similar observation was made by Maki et al. Women in age group of 18-28 years completed cognitive test such as attention/vigilance task, FOI study task, Fluency task, category exemplar generation test, FOI test, mental rotation test, Grooved peg board tests in different phases of menstrual cycle. They observed improved performance in fine motor skill and implicit memory test in the luteal phase. Performance on category exemplar generation, a test of conceptual implicit memory, was better at the midluteal than the early follicular phase. [20]

Lopez et al. after their observation on university women between 20 and 23 years old, came to conclusion that estrogen has an bettering influence on some aspect of cognitive function, which is not completely but partially in support of our observation. They were tested in four cognitive tasks; verbal memory, visuospatial ability, short term memory and visuo-motor coordination, three times across a menstrual cycle. Significant differences were found in visuo-motor coordination performance and verbal memory performance. [21]

Hartley et al found improved verbal reasoning speed in complex sentences and memory test using semantically similar word list in the luteal phase which is similar to our finding. [22]

Research in menopausal women showed an improved score on memory scale after six months of HRT in study group. Only estrogen users benefited more. [23]

Souza et al. reviewed the literature on cognitive function in different phases of the menstrual cycle in women of reproductive age, both healthy and with PMS, in particular premenstrual dysphoric disorder (PMDD). They searched MEDLINE and LILACS databases. A total of 27 studies were selected. The studies used heterogeneous methodologies. Most studies suggested that healthy women show small fluctuations in cognitive performance across the menstrual cycle, with low performance scores in the luteal phase for visuospatial and motor skills, attention and concentration, verbal memory, visual memory, working memory, and reaction time. The subtle point made in their review is contrast to our study. [24]

The result of the present study is in contradiction to the most of the research done till date. But if we consider studies using neuroimaging technique there is growing evidence suggesting improvement of cognitive functions during Ovulatory phase and mid luteal phase compared to early follicular phase.

The female brain under estrogen showed a marked increase in perfusion in cortical areas involved in cognitive tasks. [25] MRI study reported that the inhibitory influence of left-hemispheric language areas on homotopic areas of the right hemisphere is strongest during the menses, resulting in a pronounced lateralization. During the follicular phase, due to rising estradiol levels, inhibition and thus functional cerebral asymmetries are reduced. Beta estradiol enhances hippocampal memory consolidation via rapid activation of multiple intracellular signalling cascades. [26] These results reveal a powerful neuromodulatory action of estradiol on the dynamics of functional brain organization in the female brain.

CONCLUSION

After analysing our result and comparing it with the work of the other researchers we the authors are of conclusion that it will be premature to comment upon the type of influences the hormone play on cognitive function across the menstrual cycle. We need further in-depth analysis using amalgam of recent as well as old technique of evaluation cognitive function to come upon any conclusion.

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A Comparative Study of Arterial Stiffness Indices between Diabetics & Non-diabetics

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ABSTRACT

Background & objective: Diabetes is a growing health problem worldwide. Diabetes has profound effects on vasculature and its complications accounting for both morbidity & mortality. Arterial stiffening is recognized as a *critical precursor* of cardiovascular disease (CVD). Lifestyle modification is clinical efficacious therapeutic interventions for preventing and treating arterial stiffening. Arterial stiffness can be measured from Digital Volume Pulse which is economical, easier, non-invasive & less time consuming method (Finger Photoplethysmography). Hence, the current study was designed to compare the Arterial Stiffness Indices between diabetics & non-diabetics.

Materials & methods: The study involved fifty non-diabetics & fifty diabetics within the age group of 30-50 years. Subjects' height, weight and baseline value of Blood pressure, Pulse rate and Peripheral Pulse Wave were recorded in both non diabetics & diabetics. From Peripheral pulse wave, arterial stiffness indices were calculated.

Arterial Stiffness Index (SI) = Patients Height (h)/ Transit time (ΔT_{DVP})

[Transit time (ΔT_{DVP}) Time delay between systolic peak & Diastolic peak]

Reflection Index (RI) = Magnitude of Diastolic peak / Magnitude of Systolic Peak × 100

Results: Arterial Stiffness Index & Reflection Index were highly significant in diabetics than in non-diabetics, $p < 0.001$.

Conclusion: The increased arterial stiffness indices in diabetics are caused not only by hyperglycemia but also by endothelial dysfunction, carbonyl & oxidative stress. Non invasive measurements of arterial stiffness will aid the optimal stratification of CVD risk in an apparently healthy population.

Keywords: Arterial stiffness, Digital Volume Pulse, Diabetes Mellitus.

INTRODUCTION

Diabetes is a growing health problem worldwide.[1] Diabetes has profound effects on vasculature and its complications accounting for both morbidity & mortality. The risk of cardiovascular deaths in diabetic patients is equal to that of CVD without diabetes.[2] Patients with diabetes exhibit increased stiffness and the 'accelerated' arterial aging is well confirmed to be a risk.[3] Pulse wave velocity is a recognized marker of large artery stiffness. Arterial stiffness and wave reflection exerts adverse effects on cardiovascular function. Arterial stiffening is recognized as a *critical precursor* of CVD because of the reduced capacity in blood vessels and the concomitant rise in pulse pressure and fall in shear stress.[4] Therefore, assessment of arterial stiffness is believed to be useful in the prevention of CVD.

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Increased arterial stiffness is an independent predictor of death from cardiovascular disease. Cardiovascular disease (CVD) is the leading cause of mortality and morbidity worldwide.[5] Increased Pulse Wave Velocity (PWV) indicating increased arterial stiffness has been associated with increasing age, arterial blood pressure,[6] diabetes,[7] smoking,[8] and end stage renal disease.[9]

Arterial stiffness can be measured using invasive and non-invasive methods. Pulse wave analysis is one of the methods used to assess arterial stiffness. The most popular non-invasive methods are based on pletysmographic principles.[10] Others include computer oscilometry, ultrasonography and applied tonometry. Large artery stiffness can be determined by Pulse wave velocity which is a standard method. But it is difficult, time consuming and expensive. These factors have fostered the development of simple methods to record arterial stiffness. These techniques are much simpler, non-invasive, economical and easier to apply. We can also measure Arterial stiffness Indices from Digital Volume Pulse (DVP) which is economical, easier, less time consuming, non-invasive method. So the present study was designed to record Arterial Stiffness Index, Reflection Index by using Finger Photoplethysmography in diabetics & to compare it with non-diabetics.

MATERIALS & METHOD

The study was conducted in a sample of hundred subjects in Mysore. They had been divided into fifty non diabetic (control group) & fifty diabetic (study group) within the age group of 30-50 years. Subjects were selected based on inclusion and exclusion criteria.

Inclusion criteria [control group]

Fifty normal healthy non diabetic subjects aged between 30 and 50 years were included.

Inclusion criteria [study group]

Fifty Type II diabetic patients aged between 30 and 50 years were included.

Exclusion criteria [control group]

1. History of Smoking
2. History of Hypertension

3. History of Diabetes Mellitus
4. History of Cardio vascular disease
5. History of Peripheral vascular disease
6. History of Other drug treatment

Exclusion criteria [study group]

1. History of Hypertension
2. History of Smoking
3. History of Cardio vascular disease
4. History of Peripheral vascular disease
5. History of Other drug treatment

METHODOLOGY

The subjects were selected by a detailed history & thorough physical examination. They were asked to fill a questionnaire to assess their diabetic status. The experimental protocol was fully explained to the participants to allay apprehension. Informed consent was taken from all the subjects. The study was approved by Institutional Ethical Committee.

STUDY DESIGN

Data was collected by recording the DVP. Subject's weight was measured using calibrated weighing machine in light clothing and bare feet. Height was measured in meters. All procedures were performed at room temperature. Baseline pulse rate, Systolic, Diastolic & pulse pressure were measured in sitting position after 5 min of rest by using mercury sphygmomanometer.

FINGER PHOTOPLETHYMOGRAPHY

Digital Volume Pulse was measured by an instrument known as Finger Photoplethysmography, using Infra-red light with wave length of 940 nm; placed on the right index finger of the subject. The signal from the instrument was digitalized by digital converter with a frequency of 100 Hz; which was connected to the computer. The main principle of this device is conversion of pressure changes to voltage changes by means of differential pressure transducer with two inputs, positive and negative. Volume changes generated by pulse waves are transformed into pressure changes and are brought to a positive input.[10]

Subject is initially acquainted with the instrument

and a trial is given before performing for the study. DVP recording was done with the help of software virtual oscilloscope which was provided by national instrument which can be freely distributed for academic purpose. Pulse wave contour consists of two main components: the first is caused by systolic pressure wave that results from blood ejection from the left cardiac chamber to aorta and its consequent distribution to peripheral sites. The second component is formed by pressure wave reflected back to the aorta from the lower body continuing to the upper limbs.

The shape of the pulse wave is determined by a number of factors, age, sex, body height, pulse and physical fitness.[11] Length of this travelling wave is usually proportional to the subject's height (h). The time delay between systolic peak & diastolic peak is called Pulse transit time (PTT or ΔT), is inversely proportional to arterial stiffness. To correct for the size of the subject, the reflection time is divided by the height of the subject. The resultant value is SI, which is expressed in meters/second. SI is comparable to the definitive measure of arterial stiffness, the pulse wave velocity (PWV). RI is a measure of vascular tone. It is calculated by dividing the amplitude of the systolic component by the amplitude of the diastolic component. This ratio is expressed as a percentage. The parameters and their definitions are shown in Figure 1. These parameters were measured by software Image tool.

STATISTICAL ANALYSIS

The results were expressed as mean ± standard deviation (SD). A p value of <0.05 was considered statistically significant. Statistical analysis was performed using the statistical package for social & sciences. Students unpaired 't' test was applied to compare between the parameters.

RESULTS

The present cross sectional study included Fifty normal healthy non-diabetics in the age group of 30 and 50 (37.54 ± 5.11) years and Fifty diabetics in the age group of 30 and 50 (40.38 ± 8.02) years were subjected to DVP recording. Arterial stiffness was estimated from the pulse wave analysis. Both SI (8.33 ± 0.98) meters/second & RI (60.65 ± 8.71) % in diabetics were significantly higher at 95% confidence interval than non-diabetics SI (5.70 ± 0.27) meters/second & RI

(48.73 ± 8.67) %, p < 0.001. The results are shown in the table 1.

DISCUSSION

The increased arterial stiffness indices in diabetics are caused not only by hyperglycemia but also by endothelial dysfunction, carbonyl & oxidative stress. The increased arterial stiffening in diabetics is likely to reflect both structural and functional abnormalities of the arterial wall. Van Popele *et al* demonstrated an association between increased arterial stiffness and carotid intima-media thickness, a marker of atherosclerosis.[12] Measuring arterial stiffness provides good data on the endothelial condition. The endothelium affects the elastic properties of the artery by directly affecting the vascular tone. Alterations in the extracellular matrix of the media and adventitia have long been implicated in the pathogenesis of age and blood pressure-related increase in arterial stiffness.[13,14] Contributors to increased arterial stiffening in T2DM include impaired glycemic control. Non-enzymatic glycation due to raised blood glucose and consequent collagen cross linkage may also lead to alterations in the mechanical properties of the artery in diabetes.[15] Angiogenesis is already clearly implicated in cardiovascular disease as well as diabetes.[16] In addition, some studies show endothelial and vascular smooth muscle cell dysfunction in diabetic individuals compared to controls indicating that type 2 diabetes mellitus may both reduce the bioavailability of endothelial nitric oxide and attenuate sensitivity of the smooth muscle cells to nitric oxide.[17-19]

In the present study, Arterial Stiffness Index & Reflection Index was highly significant in diabetics than in non-diabetics. Similar findings were reported by Li et al, that individuals with impaired glucose tolerance and those with diabetes had higher brachial-ankle PWV values compared to individuals with normal glucose tolerance.[20] Galler et al, found similar findings in children and adolescents with type I diabetes compared to healthy children.[21]

In our study, we used SI which substitutes pulse wave velocity (PWV). It has been proved that SI positively correlates with PWV.[22] SI values are mainly influenced by large artery stiffness but they can be also affected by wave reflection from peripheral sites

as well as from large arteries.[22,23] In diabetics we found significant higher values of SI than non-diabetics, which indicates increased arterial stiffness. To determine vascular tone we used the parameter RI. RI was also significantly higher in diabetics compared to non-diabetics, indicating vascular tone is increased.
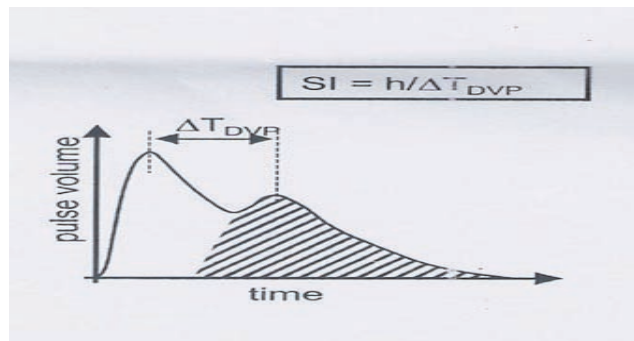
Fig:1. Pulse wave contour and definitions of evaluated parameters

RI = SYSTOLIC PEAK/DIASTOLIC PEAK

Arterial Stiffness Index (SI) = Patients Height (h)/ Transit time (+T_{DVP})

[Transit time (ΔT_{DVP}) Time delay between systolic peak & Diastolic peak]

Reflection Index (RI) = Magnitude of Diastolic peak / Magnitude of Systolic Peak × 100

Table 1: Comparison of stiffness indices between Diabetics & Non- Diabetics

Parameters	Non-Diabetics	Diabetics	'p' value
Stiffness index (m/s) (mean ± sd)	5.70 ± 0.27	8.33 ± 0.98	< 0.001
Reflection index (%) (mean ± sd)	48.73 ± 8.67	60.65 ± 8.71	< 0.001

CONCLUSION

1.   There is pronounced increase in SI and RI indicating increased arterial stiffness in diabetic patients. This suggests that they have damaged vascular endothelium.

2.   Increased arterial stiffness may contribute an additional cardiovascular risk in diabetic patients. DVP can be used to assess arterial elasticity by evaluating SI and RI.

3.   Arterial stiffness determined by Digital Volume Pulse is simple, non-invasive, less time consuming & economical.

4.   Non invasive measurements of arterial stiffness will aid the optimal stratification of CVD risk in apparently healthy diabetic individuals.

SCOPE FOR THE STUDY

Additional study including detailed evaluation of endothelial factors, diabetic profile & measurement of arterial stiffness by Pulse wave velocity is needed to clarify whether changes of cardiovascular impairment exist.

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Health Status of Elderly Women Residing in a Hospice in Pondicherry

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ABSTRACT

With advancing age, the body tends to slow down and becomes less efficient and elderly people are prone to a few age-related health issues. The present study was undertaken to assess psycho-physical health status of elderly women residing in a hospice in Pondicherry. After an introductory orientation program, thirty women with mean age 68.67 ± 7.83 yrs, agreed to be subjects and after obtaining informed consent, various parameters was recorded. Selected cardiovascular variables such as heart rate (HR), systolic pressure (SP) and diastolic pressure (DP) and respiratory rate (RR) were measured. Pulmonary function tests (PFT) were done using spirometer and reaction time (RT) measured using RT apparatus. Select psychological variables including depression, anxiety and self-esteem were assessed using Hamilton Depression Rating Scale, Hamilton Anxiety Rating Scale and Rosenberg Self-Esteem scale respectively. We found HR, SP, DP values were as expected for age and gender and our subjects performed better on PFT and RT as compared to earlier studies in similar groups. However our subjects had lower psychological health status with increased depression, anxiety and lower self-esteem. This may be due to being in hospice away from family who either do not want them or are not there at all. Though physical health status seems satisfactory for age, this finding of inadequate psychological health function may be first evidence of worsening physical health in future. We suggest that older people must be acknowledged as integral members of society and provided opportunities to enjoy good quality of life and easy access to health services. There is great scope for incorporation of traditional health practices such as Yoga and other CAM modalities.

Keywords: Health, elderly, hospice, geriatry

INTRODUCTION

Health can be understood as manifest level of functional and / metabolic efficiency of living organisms. In humans, it is the general condition of a person's mind and body.. World Health Organization defined health in its broader sense as "a state of complete physical, mental, and social well-being and not merely absence of disease or infirmity." [1]

A number of factors influence health status of individuals, including their background, lifestyle, and economic, social conditions, and spirituality - the "determinants of health." [2] Maintenance and promotion of health is achieved through a combination of physical, mental, and social well-being, together sometimes referred to as the "health triangle." [3,4]

With advancing age, body tends to slow down and becomes less efficient. Elderly people are prone to age-related health issues. Declining physical reserves, wear and tear, and fatigue set in as a result of which responses become slower and appearance changes. The prime task is to adjust to physical declines of aging, rather than become absorbed in health problems. For some aging is very frightening or depressing, while others adapt well.[5] One needs to understands it as part of entire course of human

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life, and this approach is called the life course or life-span perspective. [6] Geriatry is study pertaining to geriatrics, old age or aged persons, relating to geriatric medicine. It is concerned with promotion of health, treatment and prevention of disability and disease in old age. [7]

Physical inactivity is a key risk factor contributing to coronary heart disease, hypertension, obesity, diabetes and other psychosomatic disorders, resulting in increased mortality and morbidity and increased functional disability. Regular physical activity is essential for quality of life and wellbeing in old age and reduces the need for assistance. [8]

The present study was undertaken to assess psycho-physical health status of elderly women residing in a hospice in Pondicherry and to determine whether they would benefit from health promoting behaviours and practices such as Yoga.

MATERIALS & METHOD

Ethical clearance was obtained from IHEC of MGMCRI and then we approached old age homes in Pondicherry to select subjects to volunteer for this study. Authorities and inmates of Hospice Convent Home for the Aged, Congregation of Saint Joseph of Cluny in Pondicherry willingly volunteered to take part in this study.

An orientation program was given, explaining details of tests, purpose of study and their role in detail to ensure proper understanding and effective cooperation. After introductory program, thirty women with mean age 68.67 ± 7.83 yrs, agreed to be subjects. After obtaining their informed consent, recordings of various parameters was done.

Selected cardiovascular variables including heart rate (HR), systolic pressure (SP) and diastolic pressure (DP) were recorded using non-invasive automatic blood pressure (BP) monitor (Omron HEM 7203, Kyoto, Japan) using oscillometric method with accuracy of $\pm 5\%$ for HR and ± 3 mm Hg for BP. HR and BP were recorded after 5 min of supine rest. Respiratory rate (RR) was measured manually by observation of chest movement in supine position.

Pulmonary function tests (PFT) were done using R.M.S. Helios 401 Spirometer, version 1.0. Following parameters were recorded: Forced Vital Capacity (FVC), Forced Expiratory Volume in the 1st sec (FEV1), FEV1/FVC, Forced Expiratory Flow at 25–75% (FEF25-75), Peak Expiratory Flow Rate (PEFR), Forced Inspiratory Vital Capacity (F1VC), Forced Expiratory Flow after 25% of FVC has been expired (FEF 25%), Forced Expiratory Flow after 50% of FVC has been expired (FEF 50%), Forced Expiratory Flow after 75% of FVC has been expired (FEF 75%), and FVC% Predicted.

For PFT testing, each subject was instructed to do procedure in sitting posture, with an erect spine, without bending forward. They were asked to keep mouth piece inside their mouth with lips closed over it to avoid leakage of air while blowing and nose closed with nose clip. They performed thrice with gap of 3-5 minutes and were motivated to give their maximal effort. All parameters were noted and best of three readings recorded in data sheet.

Reaction time (RT) was measured using RT apparatus manufactured by Anand Agencies, Pune. Instrument has built in 4 digit chronoscope with display accuracy of 1 ms. Simple ART was recorded for auditory beep sound stimulus and simple VRT for red light stimulus. Subjects were instructed to release response key as soon as they perceived stimulus. Signals were given from front avoiding lateralised stimulus and they used dominant hand while responding to signal. All subjects were given adequate exposure on 2 different occasions to familiarize them with procedure. [9,10]

To assess severity of depression, Hamilton Rating Scale for Depression (HRSD), also called Hamilton Depression Rating Scale (HDRS), abbreviated HAM-D was used. Individual interview sessions were conducted and questionnaires administered. Although HAM-D lists 21 items, scoring is based on first 17. [11] Hamilton Anxiety Rating Scale (HAM-A), was used to measure anxiety. [12] Subject was asked to answer all 14 items honestly. To assess self-esteem, Rosenberg Self-Esteem Scale was used. The scale consists of 10 items measuring both positive and negative feelings about self, answered on a four-point scale from strongly agree to strongly disagree. [13]

RESULTS AND DISCUSSION

Results are given in Tables 1, 2 and 3. HR was 88.83 ± 13.94 with 16 subjects having > 90 bpm. SP was

153.70 ± 19.74 with only 3 subjects having < 120mmHg and 18 having values > 150 mmHg. Similarly DP was 90.73 ± 13.10 with only 5 of them having < 80mmHg with 14 having values > 91 mmHg.

Elderly people should have BP measured annually, and high levels (> 160/90 mm Hg) should be treated. Isolated systolic hypertension is more common in elderly where only systolic reading is elevated. As arterial system stiffens with age, SP alone may be elevated to as high as 200 mm Hg or more during ejection phase and the value of lowering it has been proved by Systolic Hypertension in the Elderly Program (SHEP). [14] It has also been suggested that 70 mmHg is an "optimal" DP in subjects with isolated systolic hypertension. In frail elderly, a value of DP < or = 60 mm Hg is associated with reduced survival, independent from large artery stiffness and left ventricular function, suggesting that more rational antihypertensive therapy, not only based on SP level, is needed. [15]

PFT values of the 30 geriatric women are given in the Table 2. When compared to predicted values, 20 had normal lung functioning while 4 had restriction, 5 had mild restriction and 1 had severe restriction. PFT is a valuable tool for evaluating respiratory function and is a simple screening procedure. [16] A cross-sectional study reported that all lung function tests were found to be negatively correlated with age and concluded that lung function significantly declined with age. [17] In another cross sectional population-based study decreased FEV1% predicted and FEV1/FVC ratio were associated with smoking, increasing age, and reported pulmonary and cardiovascular diseases. They concluded that FEV1/ FVC ratios down to 65% should be regarded as normal when aged 70 years and older. [18] Mean FEV1/ FVC values in our subjects was 93.61 ± 6.01 and this is much higher than values recorded in previous study. This may be due to a healthier environment or nutrition and/ activity in our study group. Interestingly respiratory rate of our subjects was < 18 bpm in only three while ten had rates between 18 to 20 and 17 had rates > 20 bpm.

RT indicates time taken to react to external stimulus and is an indirect method of assessing central neuronal processing. [9, 10] A previous study on effect of age, gender and Body Mass Index (BMI) showed that VRT and ART were significantly higher in older than younger individuals. Females had higher BMI and longer reaction times than males. Longer reaction times and higher BMI in females could be attributed to fluid and salt retention due to female sex hormones affecting sensorimotor co-ordination. [19]

As seen in Table 1, both VRT and ART were shorter in our subjects compared to previous reports. [19] Mean VRT in our subjects was 301.70 ± 43.71 as compared to 359.1 ± 38.75ms and ART was 288.33 ± 38.67 as compared to 341.3 ± 41.69ms in that study. However 11 of our subjects had ART > 300ms. VRT was > 350ms in only 4 subjects. Increases in RT with age can be effect of ageing on myelination of neurones and they should be more cautious during general movements and driving. [20] Hence our subjects were having better neurological health status as compared to previous studies.

As given in Table 3, 15 subjects were moderately depressed, 9 had severe depression and 6 were in very severely depressed category. All 30 subjects were in moderate to severe anxiety status implying lower psychological level of health further elucidated by low self-esteem scores where all 30 subjects scored less than 15 indicating a low level of self esteem.

The finding of lower psychological health status in our subjects with depression, anxiety and low self-esteem may be correlated to being in hospice away from family who either do not want them or are not there at all. Importance of having near and dear ones with us cannot be over emphasised and no amount of care even when it is of excellent quality seems to alleviate mental and emotional turmoil in elderly. Though their physical health status seems to be satisfactory for their age, this finding of inadequate psychological health function may be first evidence of further worsening of physical health in near future.

A recent WHO factsheet on mental health in older adults tells us, "Multiple social, psychological, and biological factors determine level of mental health of a person at any point of time." [21] According to it, good general health and social care is important for promoting older people's health, preventing disease and managing chronic illnesses. Mental health can be improved through promoting active and healthy ageing involving creation of positive living conditions and environment that supports wellbeing and healthy and integrated lifestyles. We plan to provide our

subjects an opportunity to have regular Yoga sessions at their hospice and document and publish further reports on possible improvements expected in their psycho-physical health and functioning.

Table 1: Demographic and anthropometric details, cardiovascular parameters, respiratory rate, reaction time and psychological parameters of the 30 subjects in the study group.

Parameters	Mean ± SD (30 subjects)
Age (yrs)	68.67 ± 7.83
Wt (kg)	59.23 ± 11.65
Ht (m)	1.49 ± 0.07
BMI (Kg/m^2)	26.83 ± 5.41
Heart rate (Beats/min)	88.83 ± 13.94
Systolic pressure (mmHg)	153.70 ± 19.74
Diastolic pressure (mmHg)	90.73 ± 13.10
Respiratory rate (breaths/min)	22.60 ± 4.54
Auditory reaction time (ms)	288.33 ± 38.67
Visual reaction time (ms)	301.70 ± 43.71
Depression scores	20.43 ± 6.30
Anxiety scores	29.50 ± 0.63
Self-esteem scores	6.60 ± 1.28

Table 2: Pulmonary function tests in the study group subjects. Values are given as mean ± SD for 30 subjects.

Parameters	Predicted value	Recorded value	% predicted
FVC	1.52 ± 0.37	1.43 ± 0.52	95.57 ± 29.22
FEV1	1.24 ± 0.34	1.33 ± 0.44	111.10 ± 34.73
FEV1/FVC	80.76 ± 3.00	93.61 ± 6.01	116.57 ± 9.77
FEF25-75	1.97 ± 0.27	1.98 ± 0.69	101.87 ± 35.35
PEFR	4.00 ± 0.45	3.17 ± 1.30	79.47 ± 31.83
FIVC	1.48 ± 0.38	1.39 ± 0.56	94.30 ± 31.40
FEF25%	3.73 ± 0.30	3.01 ± 1.26	79.93 ± 32.90
FEF50%	2.47 ± 0.27	2.27 ± 0.84	92.13 ± 32.52
FEF75%	0.77 ± 0.20	1.17 ± 0.44	163.10 ± 79.52
Lung age	67.90 ± 8.62	59.47 ± 22.61	88.87 ± 34.71

Forced Vital Capacity (FVC), Forced Expiratory Volume in the 1st sec (FEV1), FEV1/FVC, Forced Expiratory Flow at 25–75% (FEF25-75), Peak Expiratory Flow Rate (PEFR), Forced Inspiratory Vital Capacity (F1VC), Forced Expiratory Flow after 25% of FVC has been expired (FEF 25%), Forced Expiratory Flow after 50% of FVC has been expired (FEF 50%), Forced Expiratory Flow after 75% of FVC has been expired (FEF 75%), and FVC% Predicted.

Table 3: Number of subjects falling in each of the three subsections of depression, anxiety and self-esteem scores.

DEPRESSION	Moderate (14 - 18)	Severe (19 - 22)	Very severe (> 23)
Number of subjects	15	9	6
ANXIETY	Mild (< 17)	Mild to moderate (18 - 24)	Moderate to severe (25 - 30)
Number of subjects	none	none	30
SELF ESTEEM	Low (< 15)	Moderate (15 - 25)	High (> 25)
Number of subjects	30	none	none

CONCLUSION

From the present study conducted on 30 elderly women at a hospice in Pondicherry, we conclude that a majority of them lacked adequate psychological health and were on borderline regarding physical health status. Deterioration of psychological health was more pronounced than physical and this may be due to various social, emotional and physical factors. We suggest that older people be acknowledged as integral members of society and provided opportunities to enjoy good quality of life and have easy access to health services. Yoga and other CAM therapies should be incorporated as health promoting self-help systems. This will enhance self-esteem and provide self-accomplishment goals during sunset years.

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Study on Relationship between Anemia and Academic Performance of Adolescent Girls

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ABSTRACT

Objectives: The study was conducted to assess the relationship between the level of hemoglobin content and the academic performance among adolescent girls.

Materials and Method: The participants of the study were 168 adolescent girls of Rajkiyai Madhya Vidyalay, Sheikhpura, Patna. The adolescent girls were taken from the age group of 13-16 years. The study design was cross-sectional experimental. Hemoglobin content of the subjects was estimated by Cyanmethemoglobin method. 64.3% adolescent girls were found to be anemic, out of which 8 girls being severely anemic excluded from the study. The academic performance of 60 mild to moderate anemic and 60 non- anemic girls was assessed by the institutional unit - completion test, monthly conducted by the school administration.

Results: The experimental study showed that there was a significant positive correlation between anemia and poor academic performance among the adolescent girls (r = 0.6624).

Keywords: Academic performance; Adolescent girl; Anemia

INTRODUCTION

Adolescence is a period of transition from childhood to adulthood with accelerated physical, biochemical, social and emotional development. The final growth spurt occurs during this period. There are many bodily changes in this stage under the influence of hormones. Puberty takes place and menstruation starts in girls due to which iron and folic acid requirement is increased in adolescent stage.[1] Iron is one of the most important micro nutrients in our body. Deficiency of iron in the human body leads to anemia. Anemia occurs due to poor hygiene among girls, which in turn affects various physical and mental activities.[2] It also causes

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unusual tiredness. Anemia is not a disease but a sign. WHO defined anemia in 1968, as a condition in which the hemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiency.[3] Basta defined anemia as "a condition in which the hemoglobin content of blood is lower than the normal as a result of a deficiency of one or more essential nutrients which affects the physical work capacity by reducing the availability of oxygen to tissues which in turn affects cardiac output of the heart, eventually leading to death in severe cases".[4]

Although the global prevalence of anemia decreased between 1990 and 2010 (from 40.2% to 32.9%), the disease remains responsible for a significant burden on society, with an increase in global 'Years Lived with Disease' (YLDs) from 65.5 million to 68.4 million over the 20- year period.[5] In 1992, the WHO estimated that 37% of all women were anemic.[6] In 2008, it was reported that anemia affected 24.8% of the world's population, including 42% of pregnant women, 30% of nonpregnant women, and

47% of preschool children.[7] Most recently, global anemia prevalence was estimated at 29% in pregnant women , 38% in non-pregnant women and 43% in children, with reductions since 1995 in each group.[8] The Global Burden of Disease (GBD) 2000 report estimated that anemia accounted for 2% of all YLD 1% of disability-adjusted life years.[9,10]

In India, the prevalence of anemia among adolescent girls is 90%.[11] Variations in prevalence rate of anemia are seen within the country with the lowest prevalence of 33% being reported from Andhra Pradesh to highest of Rajsthan.[12] A high prevalence of anemia in adolescent girls is a matter of great concern as it affects their health, education, carrier and reproductive life adversely.

The main aim of the study was to find out the relationship between anemia and academic performance of adolescent girls. Another purpose of the study is to create awareness among adolescent girls and their parents about natural healthy food to prevent anemia.

METHOD

A cross-sectional experimental study was conducted during Aril – June, 2015 at Rajkiyai Madhya Vidyalay, Sheikhpura, Patna. The participants were 168 adolescent girls in the age group of 13-16 years. The adolescent girls were divided into three age groups; 13-14 years, 14-15 years and 15-16 years. The girls, whose parents did not give consent for the Hb% estimation, were excluded from the study. Severely anemic or sick adolescent girls were also excluded from the study.

Collection of the blood samples: 2 ml of venous blood sample was drawn under aseptic precaution by venepuncture from antecubital vein and it was collected with Ethylene diamine tetra acetic acid (EDTA). Hemoglobin content was estimated by Cyanmethemoglobin method in the department of pathology, IGIMS, Sheikhpura, Patna. After estimation of hemoglobin content in the blood samples of the subjects, 20 anemic girls were randomly selected from each age group. The study was conducted with 60 anemic girls as cases and 60 non- anemic girls as controls.

Data were collected in a cordial environment after obtaining consent from the adolescent girls and their parents. A predesigned schedule was used to collect the basic information about the participants and their parents. Socio-demographic characteristics like age, educational status, per-capita monthly income of their families and personal history like age at menarche, history of hookworm infestation and excessive menstrual bleeding were noted.

Height of the subjects was measured by using a standard height measuring scale and weight was recorded by standard electronic weighing machine without any footwear.

The academic performances were assessed by the monthly examination conducted in the month of May, 2015 by the school administration. Lecture classes were also organized for creating awareness among the adolescent girls and their parents about prevention from hookworm infestation and its treatment. The importance of natural healthy food to the adolescent girls was explained by a nutrition expert. The scores of academic performance and hemoglobin content were taken from both cases and controls.

The data were processed and analyzed by SPSS 17. To find out correlation between hemoglobin level and academic performance of adolescent girls, co-efficient of correlation (Spearman's coefficient) and regression equation methods were used for analysis of the data.

RESULTS

There were 168 adolescent girls taken for this study, out of which 8 girls being severely anemic, excluded from the study. The study was conducted on remaining 160 adolescent girls. Among the 160 adolescent girls, 25% were in the age group of 13-14 years from class VI, 35% girls in the age group of 14-15 years from class VII and 40% girls in the age group of 15-16 years from class VIII. Thus prevalence of anaemia among adolescent girls was found to be 67.5%. Out of 168 adolescent girls, 63 were suffering from mild degree of anaemia and 37 were having moderate degree of anaemia and the 8 girls, who were severely anemic, excluded from the study and recommended for urgent treatment.

Among the parents of adolescent girls 42.5%

have had primary education, 37.5% have studied up to secondary education, 15% have gone up to higher secondary level and only 5% have completed graduation. As per modified Prasad's classification and taking consumer price index of April 2012 into consideration, 67.5% of the families belonged to lower socio-economic group and 32.5% of the families belonged to middle socio-economic group.

In the present study, the mean hemoglobin content among adolescent girls is 9.88±1.10g/dl and the range varies from 7.5-11.8 g/dl. When the girls were assessed for nutritional status by assessing BMI, 57.5% of the girls were found to be normal where as 42.5% of the girls were undernutrition.

TABLE I: Severity of Anemia

Adolescent age groups	Mild anemia Hb< 10-12gm%	Moderate anemia Hb< 7-10gm%	Severe anemia Hb< 7gm%	Total
13-14 years	14	11	02	27
14-15 years	23	12	03	38
15-16 years	26	14	03	43

TABLE II: Socio- demographic factors and personal characteristics associated with anemia in Adolescent girls –

Factors / Characteristics		Total number of girls	Anemic girls	P value
Adolescent girls age groups	13-14 years	50	25 (50%)	0.047
	14-15 years	55	35 (63.6%)	
	15-16 years	55	40 (72.7%)	
Parents' education	Primary or less	68	56 (82.4%)	0.039
	Secondary or more	92	44 (47.8%)	
Socio – economic status	Lower	108	76 (70.4%)	0.032
	Middle	52	24 (46.1%)	
Nutritional status	Normal	92	56 (42.4%)	0.034
	Undernutrition	68	61 (89.7%)	
Menarche	Attained	144	90 (62.5%)	0.241
	Not attained	16	10 (62.5%)	
H/O hookworm infestation	Present	34	30 (88.2%)	0.042
	Absent	126	70 (55.5%)	
Menstrual blood flow	Normal	112	58 (51.8%)	0.002
	Heavy	48	42 (87.5%)	

In the present study, it was observed that prevalence of anaemia was 50% in 13-14 years age group as compared to 63.6% in 14-15 years and 72.7% in 15-16 years adolescent age group. Anaemia in adolescent girls of the parents with primary or less education is significantly higher than the girls of highly educated parents. Anaemia was also significantly higher in the families with lower socio-economic status than the families with middle socio-economic status (P=0.032).

Personal characteristics like menarche status did not show any significant association with presence of anaemia but H/O worm infestation found to have a significant association. Anaemia was also found to be significantly higher among the girls with heavy menstrual flow (P=0.002) and the girls with undernutrition (P=0.034).
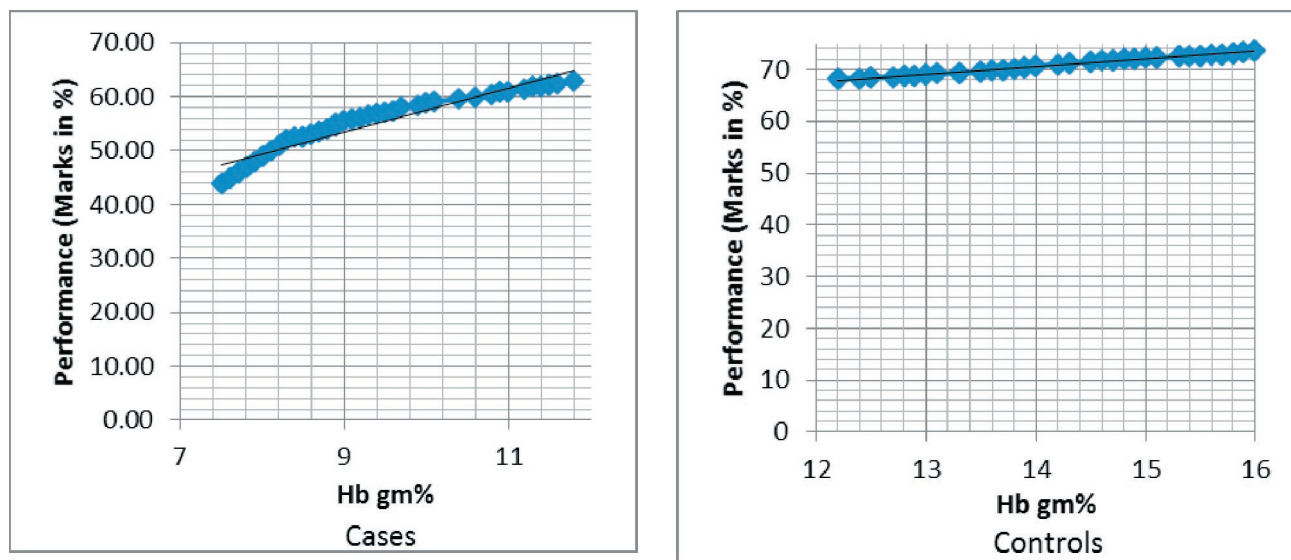
Figure I: Correlation between anemia and academic performance of adolescent girls –

Analysis of the data obtained after hemoglobin estimation and assessment of academic performance of the adolescent girls, it was found that there was a strong correlation between low hemoglobin level and poor academic performance of the anemic adolescent girls (r = 0.6624). The correlation was comparatively poor among normal adolescent girls(r = 0.2955).

DISCUSSION

In the present study the prevalence of anaemia in adolescent girls was found to be 64.3%. Only about 35.7% girls were having normal range of hemoglobin. Rana et al[13] and Seshadri et al[14] reported a prevalence of 60% and 63% respectively, very close to our results. Chaturvedi et al reported a prevalence of 73.7% which is also similar to our findings.[15] WHO/UNICEF has suggested that the problem of anaemia is of very high magnitude in a community when prevalence rate exceeds 40%.[16]

Among the 108 anemic girls, mild and moderate degrees of anemia were 58.3% and 34.2% respectively. There was subsequent increase in prevalence of anemia in 14-15 and 15-16 years age groups. Our findings were consistent with the study conducted by Sanjeev et al, who reported that the prevalence of anaemia was high among late adolescents as compared to early and mid adolescents.[17]

In the present study, presence of anaemia was significantly higher in girls of parents with primary or less educational status (P = 0.039). Rawat CMS et al and Rajaratnam et al had observed significant association of presence of anaemia with parents' poor educational status, particularly mother's education.[18,19] Anaemia was significantly prevalent in lower socio-economic group (P = 0.032). A significant association was also found between anaemia and excessive menstrual bleeding (p=0.002). Kaur S et al observed similar findings in their study.[20] We also found a significant association between anemia and undernutrition among adolescent girls (P=0.034).

Agarwal et al have reported that iron deficiency anemia has been shown to have an adverse effect on cognitive processes as indicated by lower scores of anemic children on test of development and learning.[21] In 1988, Lozoff found that Iron deficiency adversely affects behavior by impairing cognitive functions and work capacity.[22] Cai and Yan, in 1990 observed that speed and endurance capabilities of students were correlated directly with hemoglobin level.[23] Li et al reported that iron deficiency reduces the mental and motor development test scores among infants.[24] In our study we found a strong correlation between low hemoglobin level and poor academic performance among the anemic adolescent girls (r = 0.6624). The correlation was comparatively poor among normal adolescent girls(r = 0.2955). Adolescents need nutritious food, particularly requirement of iron is much higher among females.[25]

CONCLUSION

Children during school age and especially in the age of adolescence suffer from anemia due to iron deficiency. Prevalence of anaemia in adolescent girls is a public health concern. High prevalence of mild and moderate anaemia among adolescent girls demands urgent and effective intervention because there is a strong correlation between low hemoglobin level and poor academic performance. Prevalence of anaemia can be lowered by intensive nutrition education by health care providers and encouraging girls to take Iron and folic acid tablets both for prophylaxis and treatment through coordinated nutrition education in schools.

Acknowledgement: Nil

Ethical Clearance: Taken

Support: Nil

Conflict of Interest: Nil

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Estimating Cardiovascular Prognosis by Exercise Treadmill Test: A 5 Year Follow-up Study

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ABSTRACT

Background: Treadmill exercise test was based on the principle that exercise increases myocardial oxygen demand, which although adequate at rest, becomes inadequate during exercise.[1]

Method*:* Present study includes 200 cases of Stable angina of age group 25-65 years found positive for ST depression in resting ECG with complains of angina undergone *stress exercise treadmill test* by Dukes method followed by Coronary Angiogram as per the ACC/AHA guideline from 2010 to 2015. The median length of follow-up at the time of analysis was 5-years.

Results: High risk and moderate risk group patients showing significant negative Duke Score, ST-inversion, Maximal MHR, SBP at maximal exercise with significant CAD and low 5-year survival as compared to low risk group patients.

Conclusion: Considering the importance of early diagnosis, risk stratification and timely interventions will be helpful in preventing morbidity and mortality.

keywords: Coronary Artery Disease, Duke's Treadmill Score, Ischemic Heart Disease, Maximal Heart Rate, Systolic Blood Pressure, Treadmill Test.

INTRODUCTION

Abnormal hemodynamic responses to exercise treadmill testing may indicate an increased risk of coronary events and death, even if evidence of ischemia is absent[1]. Coronary artery disease assuming serious dimension in developing countries and also expected to be the single most important cause of death in India by the year 2015 and predicted to increase a further 50% by 2030. India suffers the highest loss in potentially productive year of life, due to death from CAD in people aged 35-64 years.[2,3] Exercise electrocardiography is a noninvasive method to evaluate myocardial functions. It has become increasingly popular in early detection of ischemic heart disease, for the effects of medical, surgical treatment and for rehabilitation of heart patients[4]. Treadmill exercise test was based on the principle that exercise increases myocardial oxygen demand, which although adequate at rest, becomes inadequate during exercise. Consequently, the ECG manifestations which were normal or equivocal at rest, become abnormal and significant during exercise to diagnose ischemic heart disease[4,5,6].

MATERIALS & METHOD

Present study includes 200 cases of Stable angina of age group 25-65 years, which includes 159 males and 41 females, who were found positive, with ST depression in resting ECG with complains of angina had undergone *exercise treadmill test* by modified Dukes method and Coronary Angiogram as per the ACC/AHA guideline from 2010 to 2015.

Parameters

I. Bruce Protocol

II. Exercise Duration in Minutes

III. ST Segment Inversion

IV. Duke Treadmill Score

V.   Maximum Heart Rate

VI. Systolic Blood Pressure at maximal Exercise

VII. Angiographic Study

VIII. Prognosis – 5 yr. Survival

a.   Inclusion Criteria[4,6]

i.   Evaluation of Symptomatic Patients

ii. Screening of Asymptomatic Patients

iii. Severity

iv. Effectiveness of Treatment

v.   Evaluation of symptoms

vi. Functional Assessment

vii. Prognosis

viii. Exercise capacity

b.   Exclusion Criteria

i.   Recent acute cardiac event

ii. Acute myocardial infarction (within2 days)

iii. Acute systemic infection

iv. Arrhythmias

v.   Hypertension (systolic blood pressure >200 mmHg and/or diastolic blood pressure >110 mmHg.

Bruce Protocol

This has a relatively higher initial workload with greater subsequent work increments. The subject starts at 1.7 MPH on a 10% incline and progresses to his/her maximum capacity at 3 minutes intervals. With increasing speed and grade of incline of the treadmill, depending on the exercise capacity of the individual, a total time may be short as few seconds or as long as 21 minutes for the well trained long distance runner. The average time for ambulatory cardiac patient is 10-12 minutes, if each stage is spaced at 3 minutes interval[15,16]. Multistage treadmill exercise testing was a safe and a reliable method[21,22,23]. The amount of exercise prescribed may be maximal or submaximal. A maximal exercise test is individualised to a self-determined end point such as fatigue, chest pain of angina, dyspnoea, exhaustation-called '*symptom-limited testing'.*

Duke Treadmill Score

DTS = Exercise Time – 5 × (ST deviation) – (4 × exercise angina index)

Exercise angina index – 0 – No angina

1 – Angina non-limiting

2 – Angina exercise –limiting

Informed consent obtained after explaining the procedure. The treadmill machine used was RMS TMT MARK-II (2.1.85) RECORDER AND MEDICARE SYSTEMS. After evaluating cardiac history and physical examination patients underwent resting 12-lead electrocardiography before the exercise study. These data and results of stress exercise test, prospectively entered into a computerized medical-information system for further analysis. Patients who were found positive in stress exercise treadmill had undergone for coronary angiographic study.

Three risk groups created into high, moderate and low risk groups according to Duke's score ≤ -10, -10 to +4 and ≥ +5 respectively. Follow-up of patient's done by OPD visits, and telephonic interview at 1 month, 6 month, 1 year, and then yearly thereafter. Overall, follow-up for vital status was 98 percent complete at all follow-up contacts. The median length of follow-up for the study groups at the time of analysis was five years. Data collection, compilation and analysis done using SPSS-17 statistic software and $p<0.05$ as significant. Parametric data analysed by using oneway-ANOVA and MHR, SBP at maximal exrercise by Kruskal-Wallis H Test. Death or mortality due to cardiovascular cause included in the study. Prognosis or Five year mortality analysed by Kaplan-Meier Survival Index. Linear regression analysis was done between prognosis and ST-Inversion, prognosis and exercise duration, prognosis and duke score.

RESULT

a)   Risk Factors and Gender Risk

Male (79.5 (%) are at higher risk as compared to female(20.5 (%) out of total cases. Median age for male 49 ± (9.8) years and female 51 ± (8.1) years and average to be 49.54 ± (9.5) years. Male and female of age group 46-55 years were at higher risk. Patients with hypertension and family history of CAD had high risk, belongs to 78.5% and 66.5% of total cases. Diabetes, obesity, smoking, hyperlipidemia was 18%, 17%, 12.5% and 3.5% respectively also accounts for developing CAD showed in Table No. 1 and 2.

Table No – 1 Risk factor associated with CAD

Risk Factors	Total Cases (%
Male Sex	79.5
Hypertension	78.5
Family history of CAD	66.5
Diabetes	18
Obesity	17
Smoking	12.5
Hyperlipidemia	3.5
P/H of Angina	3

Table No – 2 Gender Risk

Age Years	Male Percentage (79.5%)	Female Percentage (20.5%)	Total Percentage (%)
25-35	7.55	4.88	7
36-45	23.27	14.63	21.5
46-55	42.77	46.34	43.5
56-65	26.41	34.15	28

b) Risk Groups and Parameters

Moderate risk group cases were highest followed by high and low risk groups i,e. 73%, 18% and 8% respectively. Duke score was negative for high and moderate risk, where as positive for low risk -17.21 ± (6.33)$^{\Omega}$, -2.72 ± (3.73)$^{\Omega}$, 6.33 ± (1.42)$^{\Omega}$ respectively. ST-inversion was significant in high and moderate risk group as compared to low risk groups -3.50 ± (1.60)$^{\Omega}$, -1.56 ± (0.57)$^{\Omega}$, -0.64 ± (0.40)$^{\Omega}$ respectively. High risk group patients were able to perform exercise least as compared to moderate and low risk groups 3.14 ± (2.48)$^{\Omega}$, 5.24 ± (1.90$^{\Omega}$, 9.07 ± (1.62)$^{\Omega}$ respectively. High risk patients achieved least maximal heart rate 138 ± (12)$^{\#}$ beats per minute and achieved maximum systolic blood pressure at maximal exercise was highest 176 ± (7.32)$^{\#}$ mmHg as compared to moderate and low risk group patents. Angiographic study of high and moderate risk groups showed significant coronary artery disease. Mortality of high risk and moderate risk groups were significant. Prognosis or 5-year survival of high risk group patients was lowest followed by moderate and low risk groups 40.33* ± (8.62), 56* ±(5. 68), 77* ±(4.85) respectively showed in table no-3.

Table No. – 3 Risk groups and Parameters

Parameters	High Risk group (Score ≤ -10)	Moderate Risk Group (Score -10 to +4)	Low Risk group (Score ≥ +5)
Percentage of Cases	18 % (n = 22)	73 % (n = 150)	9 % (n = 28)
Dukes Score	-17.21 ± (6.33)$^{\Omega}$	-2.72 ± (3.73)$^{\Omega}$	6.33 ± (1.42)$^{\Omega}$
ST – inversion	-3.50 ± (1.60)$^{\Omega}$	-1.56 ± (0.57)$^{\Omega}$	-0.64 ± (0.40)$^{\Omega}$
Exercise Duration	3.14 ± (2.48)$^{\Omega}$	5.24 ± (1.90$^{\Omega}$	9.07 ± (1.62)$^{\Omega}$
Maximum Heart Rate Achieved (beats per minute)	138 ± (12)$^{\#}$	152 ± (16)$^{\#}$	169 ± (12)$^{\#}$
Systolic Blood Pressure(mmHg) at Maximal Exercise	176 ± (7.32)$^{\#}$	161 ± (13.35)$^{\#}$	148 ± (11.14)$^{\#}$
Angiographic Study			
No pathogenic vessel	-	14.46 %	-
Single vessel disease	12 %	31.32 %	-
Double vessel disease	24 %	37.35 %	-
Triple vessel disease	64 %	16.86 %	-
Mortality (Deaths)	8 Cases	7 Cases	Nil
Prognosis (5 yr Survival)	40.33* ± (8.62)	56* ±(5. 68)	77* ±(4.85)

Data in Percentage (%) mean, SD(±), Symbol *,#,Ω, shows significant data - $p<0.05$.

Correlation of Exercise duration and Prognosis:

Graph no. 1, 2,3, showing the linear regression analysis of prognosis and ST-inversion, prognosis and exercise duration in minute, prognosis and Duke Score respectively.
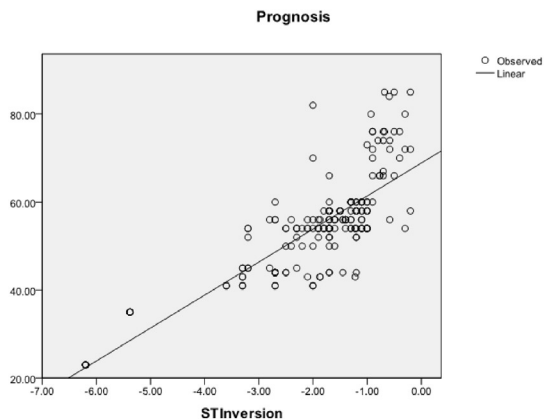
Graph No. 1 Linear regression analysis of Prognosis and ST-inversion
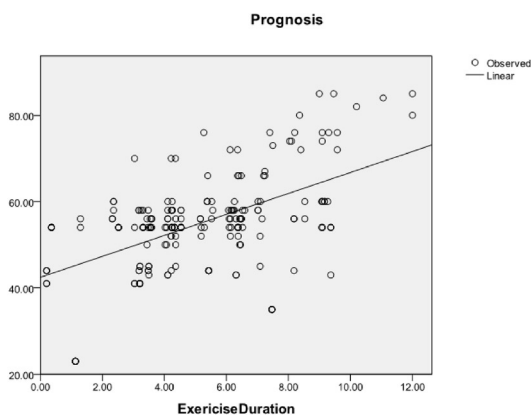
Graph No. 2 Linear regression analysis of Prognosis and Exercise Duration(min)
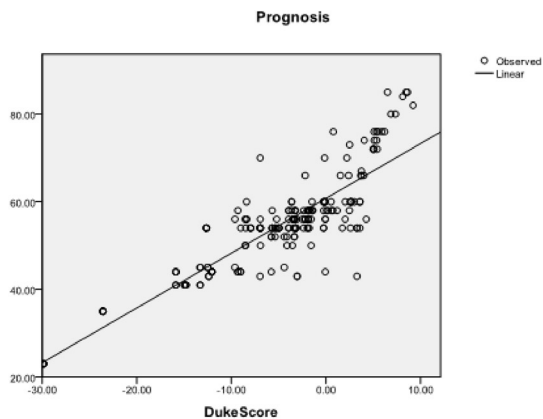
Graph No. 3 Linear regression analysis of Prognosis and Duke Score

DISCUSSION

Established correlation of developing atheroscelrosis leading early development of CAD[26] includes risk factors like male sex, hypertension and family history of coronary artery disease followed by diabetes, obesity and smoking. Male and female 46-55 years are at higher risk and median age 49 years are at higher risk of developing CAD. Age plays a dominant influence risk of developing CAD. Between ages 40 and 60 the incidence of myocardial infarction is increases fivefold. Death rates from IHD rise with each decade even into advanced age. Gender plays equal, premenopausal women are relatively protected against atherosclerosis and its consequences compared to age-matched men. After menopause, however, the incidence of atherosclerosis-related disease increases and older ages actually exceeds that of men[25].

High and Moderate risk group patients were unable perform exercise for more duration. So it is the exercise testing, which permits the physician to evaluate the patient by increasing workload that may result in reproduction of the symptoms when they are secondary to myocardial ischemia. ST-inversion was significant in high and moderate risk groups. Using the Dukes database, McNeer and co-workers demonstrated that an "early positive" exercise test result (ST depression greater than or equal to 1 mm in the first 2 stages of Bruce protocol) identified a high-risk population[6,12,27,33].

High risk patients unable to achieve MHR as compared to moderate risk and low risk groups. Systolic blood pressure at maximal exercise of high risk patients attained very early as compared to both the groups. Exercise hypertension predicts the future arterial hypertension in people with normal resting blood pressure[9,10,11,12,13].

Low risk group patients performed exercise for 9 minutes which is the average time for middle aged adult i.e, 8 – 10 minutes. Because the longer the patient goes, the harder he or she must work, exercise duration-the number of minutes the patient can continue the protocol-is a good measure of his or her functional capacity. Remarkably, the patient can keep going on the treadmill, the less likely he or she is to die soon of coronary artery disease or any cause. Exercise duration was such a good prognostic indicator that it is included in risk scores for exercise

treadmill testing[5,6,7,8].

Coronary angiogram study revealed that the high risk and moderate risk subjects have developed significant CAD. Mortality due to myocardial ischemia found to be highest in high risk group followed by moderate risk group. From linear regression analysis it was found that negative ST-inversion, low exercise performance and negative duke Score had low prognosis (5-year survival) and vice versa. Coronary angiographic study confirmed the development of coronary artery stenosis in high and moderate risk groups. During 5-year follow up study 15 deaths reported and the survivors had opted different treatment modalities.

SUMMARY

Since, coronary diseases progresses without escalation of symptoms, recognition of angina as an unreliable index for the objective assessment of severity of coronary artery disease should be encouraged. The prognosis of coronary artery disease was detected by stress exercise treadmill test and duke treadmill score. The study performed here in stable angina patients in whom one or several coronary risk factors were present, have shown the exercise test is frequently positive. The positive results in such patients is additional proof of the value of non-invasive test in the detection of silent coronary heart disease.

It was obvious that major ST-segment depression, low exercise performance and negative duke score associated with a highest rate of complications along with a morbidity and mortality. Thus, the prognostic treadmill score tested in this study accurately predicted outcome in outpatients with suspected coronary artery disease who were referred to the exercise laboratory for evaluation. It is suggested that the exercise test may be performed routinely in diabetics, asymptomatics, presymtomatics, persons with risk factors. By this means coronary artery disease may be detected in the asymptomatic stage; this is particularly important in whom advanced IHD may be clinically silent[28].

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To Study the Effects of duration of Yoga Training on Post Exercise Recovery Time

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Abstract- It has been seen that regular yoga practice improves cardio respiratory functions. This study plan is to observe the effects of duration of yoga practice on post exercise recovery time. Our total sample size was 60.Out of which 32 were male and 28 were female subjects. First Baseline reading of HR and blood pressure were taken before starting of the test. Subjects were asked to do Harvard's step test exercise. After exercise HR and BP were measured at the interval of 1,2,3,4,5,6,7,8,9,10,13 and15 minutes. Recovery time for HR and Blood pressure was noted. Yoga training was given for two months. During the study at the end of one month and two months above test was performed. Our study revealed that at the end of one month of yoga training there was no significant fall in post exercise recovery time for pulse(p-0.156) but there was highly significant change was seen at the end of two months.(p<0.001). Similarly post exercise recovery time for blood pressure did not change significantly at the end of one month of yoga practice (p-0.902) but at the end of two months there was highly significant fall in post exercise recovery time for blood pressure.(p<0.001).This proved that minimum duration of 2 months of yoga practice improves post exercise recovery time i.e. improves cardiac functioning.

Keywords- *Harvard's test, Recovery time, Yoga*

INTRODUCTION

The term yoga has its verbal root as ("Yuj") in Sanskrit. "Yuj" means joining or union. . In traditional terminology, it is joining of "jiwatma" (individual soul) with "paramatma" (supreme soul).[1-4] Patanjali formed the essential features and principles of yoga in the form of "sutras" nearly 4000 years ago.[5] Yoga is separated into Six Branches. 1. Bhakti Yoga 2. Raja Yoga 3. Jnana Yoga 4. Karma Yoga 5. Tantra Yoga and 6. Hatha Yoga which is the most popular branch of Yoga. In general, when people mention about Yoga, they refer to Hatha Yoga.[3,6]

Yoga practice consists of the five principles including proper relaxation, proper exercise, proper breathing, proper diet, and positive thinking including meditation. Yoga respiration consists of very slow, deep breaths with sustained breath hold after each inspiration and expiration. Asanas involve various postures which cause relaxation, stretching and balancing. Pranayama influence our pranamaya kosha i.e. the vital energy sheath. Slow, deep and rhythmic breathing is ideal for controlling emotions.

It was reported previously that Yoga training improves cardio respiratory functions, and skeletal muscle strength. But there are very few studies showing effects of duration of yoga on cardiac functions. Benefits of yoga depend on duration of yoga practice. Long term practice of yoga gives more health benefits. Few studies show that positive heath benefits of yoga are obtained only after some weeks of regular yoga practice. This study plan is to test the effects of duration of yoga practice on post exercise recovery time i.e. time required for correction of pulse and B.P. after exercise.

MATERIAL & METHOD

The present study was conducted in Department Of Physiology at Medical College. The study was carried out on the male and female volunteers of age group20 to 45 years from yoga centre in the city. Approval was taken from department and ethical committee. Total sample size was 60.Out of them 32 were male and 28 were female subjects.

Inclusion criteria-

1 .Only healthy male and female subjects of age group 20-45 years

2. Subjects who had not undergone yoga practice before

Exclusion criteria-

1. Subjects with any known cardiopulmonary disorders

2. Subjects with any known endocrine or musculoskeletal disorders

3. Subjects with any systemic disease which affects the lung functions

4. Smokers

Anthropological parameters like height in cm, weight in kg and BMI were noted.

Post exercise recovery time-

Harvard's step test-

First subjects were asked to sit and relax. Baseline reading of HR and blood pressure were taken before starting of the test. Subjects were asked to step up and down on 45 cm high platform at rate of 30/min for total duration of 5 min or until fatigue. After exercise HR and BP were measured at the interval of 1,2,3,4,5,6,7,8,9,10,13 and15 minutes in sitting position. The time at which HR and blood pressure returned to their initial reading was recorded separately. It was the recovery time for HR and Blood pressure.[7,8] Yoga training was given for two months as per schedule shown in table1. Yoga was done in morning hours from 6 a.m. to 7 a.m. for six days a week.

During the study at the end of one month the above tests were performed. The same tests were performed at the end of two months in similar conditions. During the study all the volunteers cooperated well and no volunteers withdrew from the study.

Statistical Analysis[9]:-

All the data was collected and subjected to statistical analysis. Oneway Repeated Measure ANOVA test was performed to compare differences at different time points. Statistical software STATA Version 10.0 and SPSS version 16.0 were used for statistical analysis.

Table 1:Yoga training programme

Sr. no.	Name	Time
1	Prayer	5 min
2	Pranayama-Kapalbhati ,Anulom vilom, Bhastrika, Bhramari	20 min
3	Combination of following Asanas - Naukasana, Matsyasana, Bhujangasana , Dhanurasana , Talasan, Utkatasan, Trikonasan, Ardhamatsyendrasan, Pavanmuktasan, Matsyasan, Pashchimottanasan, Halasan, Sarvangasan	30 min
4	Shavasana	5 min
	Total	**60 min**

Observations and Results -- The study was done on 60 male and female volunteer subjects. Readings of the parameters were taken before starting yoga training, at the end of one month and then at the end of 2 months. Data was analyzed and it is shown in following tables and diagram.

Table2: Demographic characteristics of study subjects

Variable	Mean	SD±	Range
Age in years	33.45	8.05	20-45
Height in cm	165.31	7.66	152-190
Weight in kg	60.1	9.42	44-83
BMI	21.9	2.36	17.1-26.1

Table3: Effect of duration of yoga training programme on recovery time (pulse)

	Mean recovery time(pulse) in min	SD
Before	11.9	2.36
I month	11.40	2.60
2 month	8.46	2.30

Table 4: Comparison of recovery time for pulse at different follow-up

One-way Repeated Measure ANOVA test			
F-value = 116.45 p<0.001,HS			
Multiple comparison test (Tukeys Test)			
Comparison	Mean difference	p-value	
Before Vs 1 month	0.50	0.156	Not Significant.
Before Vs 2 month	3.433	<0.001	Highly Significant

TABLE5: Effect of duration of yoga training programme on recovery time (blood pressure)

	Mean recovery time(BP) in min.	SD
Before	9.35	1.88
I month	9.12	2.11
2 month	6.16	1.48

TABLE6: Comparison of recovery time for blood pressure at different follow-up

One-way Repeated Measure ANOVA test F-value = 139.15 p<0.001,HS			
Multiple comparison test (Tukeys Test)			
Comparison	Mean difference	p-value	
Before Vs 1 month	0.233	0.902	Not Significant.
Before Vs 2 month	3.183	<0.001	Highly Significant

Table2 show distribution of subjects according to their age, gender, height, weight and BMI. Age group for study was 20-45 years while the Mean age was 33.45±8.05 years. There were 32 male and 28 female subjects out of total 60 subjects. Mean height was 165.31±7.66cm as shown in table 2.Mean weight was 60.1±9.42kg. Mean BMI was 21.9±2.36. Range of BMI was 17.1-26.1. 93.4% subjects had their BMI in between 18-25.(table 2)

Table 3 and figure 1 shows mean recovery time for pulse after Harvard's step test. Before training it was 11.9±2.36 min. After one month it was 11.40±2.60 min and after two months it was 8.46±2.30 min. When compared with ANOVA test, after one month it showed no significant change(p-0.156) but after two months it showed highly significant fall (p<0.001) as shown in table 4

Table 5 shows the effect of duration of yoga training programme on recovery time for blood pressure. Mean recovery time for BP was 9.35± 1.88min before training. After one month training it reduced to 9.12±2.11 min and after two months it reduced to 6.16±1.48 min. When it was compared at different follow up, no significant difference was seen after one month (p-0.902) of training. But at the end of two months training there was highly significant difference (p<0.001)(table 6).

DISCUSSION

Our study revealed that at the end of one month of yoga training there was no significant fall in post exercise recovery time for pulse(p-0.156) but there was highly significant change was seen at the end of two months.(p<0.001)

Similarly post exercise recovery time for blood pressure did not change significantly at the end of one month of yoga practice(p-0.902) but at the end of two months there was highly significant fall in post exercise recovery time for blood pressure.(p<0.001)

Our study findings are consistent with

Madanmohan et al (2004)[7] as they proved that after two months of yoga training, exercise induced changes in pulse and blood pressure were significantly reduced. Post exercise recovery time also reduced, suggesting better exercise tolerance.

Muralidhara & Ranganathan et al(1982)[10]showed an improvement in cardiac recovery index after 10 week yoga training programme.

With the help of these studies we can conclude that two months of yoga practice can reduce post exercise recovery time. This hypothesis is also applicable to our study.

Some authors studied effects of yoga practice on some cardio respiratory parameters.

Upadhyay Dhungel K et al (2008)[11] showed, the effects of alternate nostril breathing (ANB) on some cardio-respiratory functions. Results indicated that regular practice of ANB increases parasympathetic activity.

N.K. Subbalakshmi et al(2005)[12] studied the immediate effect of 'Nadi- Shodhana Pranayama' on some selected parameters of cardiovascular, pulmonary and higher functions. They suggested that the 'Nadi-shodhana Pranayama' rapidly alters cardiopulmonary responses.

Bera & Rajapurkar et al (1993)[13] showed a significant improvement in cardiovascular endurance and anaerobic power as a result of yoga training.

Pramanic T et al (2009)[14] concluded that pranayama has strong tendency to improve the autonomic nervous system through enhanced activation of the parasympathetic system.

There are certain reasons for beneficial effects of yoga on cardiovascular parameters and improvement in recovery time.

1) Yoga causes reduction in sympathetic discharge and increase activation of parasympathetic system.[11,14]

2) Increased oxygen availability to organs via increase in pulmonary diffusion.

3) After yoga training, there is less myocardial oxygen consumption after a given level of exercise.[7,15]

4) Exercise causes increase in the capacity of muscles to extract more oxygen as it causes increase in capillary network and increased mitochondria in muscle fibre. Asanas causes some muscle exercise so it may have same effect on muscle fibers.[16] These are the known reasons of yoga benefit.

CONCLUSION

From this we conclude that yoga training has beneficial effects on various body functions and it reduces post exercise recovery time for pulse and BP. But for this it is necessary to practice yoga more than 2 months and to continue it forever. So it is recommended to perform regular yoga practice by all the persons to keep themselves healthy and disease free. Thus yoga can be used as preventive as well as therapeutic measure for many health disorders. It is best, easy and cheap tool which can be followed in our daily life.

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Prevalence of Microalbuminuria - An Early Detector of Diabetic Nephropathy

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ABSTRACT

Background: Microalbuminuria is the presence of albumin in urine above the normal level but below the detectable range of conventional methods. Its presence is an early marker of diabetic nephropathy.

Aim & Objectives: 1. Detect prevalence of microalbuminuria in type 2 diabetic patients.

2. Correlate microalbuminuria with age, sex and duration of disease.

3. Correlate microalbuminuria with blood sugar (fasting and post- prandial), serum creatinine and Blood urea nitrogen (BUN).

4. Compare microalbuminuria in controlled (HbA1c<7) and uncontrolled (HbA1c> 7) type II diabetics.

Method: Around 100 cases of diabetic patients of age group 30-80 years, with duration of diabetics more than one year were examined for fasting and postprandial blood sugar(FBS and PPBS), HbA1c, BUN and serum creatinine. Also 24 hour urine sample was analysed for microalbuminuria by turbidometric method.

Results: The prevalence of microalbuminuria was 48% with p value 0.004. Also a significant correlation of microalbuminuria was seen with FBS, PPBS, BUN, and serum creatinine. However no correlation of microalbuminuria was established with HbA1c and duration of disease. Further microalbuminuria was increased in uncontrolled diabetics than controlled diabetics though it is not statistically significant.

Conclusion: Our study concludes that microalbuminuria is essential for early detection of diabetic nephropathy. Therefore it is recommended that microalbuminuria test should be done at regular intervals for type II diabetes mellitus.

Keyword: Type II diabetics, microalbuminuria, HbA1c, diabetic nephropathy.

INTRODUCTION

Diabetes mellitus is a worldwide public health concern and is associated with reduced mortality and significant morbidity. It leads to specific diabetes related macro vascular complications like myocardial infarction, stroke, renal failure, blindness and amputations. According to the World Health Organization (2004), diabetes affects more than 170 million people worldwide, and this number will rise to 370 million by 2030. About one third of type 2 diabetics will eventually have progressive deterioration of renal function[1]. Microalbuminuria is an abnormal elevation of albumin levels in the urine that cannot be detected using conventional dipstick method[2]. It is defined as urinary albumin excretion between 20-200 µg/min or upto 15 mg/L over a 24 hour period[3]. It represents very early stages of diabetes mellitus (DM) when glomerular filtration rate (GFR) is normal .Thus it is an early marker of the subsequent development of proteinuria and diabetic nephropathy a leading cause of end stage renal disease and premature cause of death worldwide. Progression to established diabetic nephropathy occurs through several stages and microalbuminuria predicts future development of overt nephropathy[4].

Diabetic nephropathy occurs in about 30% of patients with type 1 diabetes mellitus & 25% of patients type 2 diabetes mellitus[5]. The purpose of this study was to evaluate the presence of microalbuminuria in patients with DM and toascertain its relationship with the age, disease duration, blood sugar levels, HbA1c, BUN and Creatinine.

MATERIAL & METHOD

This is a retrospective study carried out in 100 type 2 diabetes mellitus patients to detect the prevalence of microalbuminuria and to investigate correlation of microalbuminuria with age, sex, duration of the disease, blood sugar levels, HbA1c and markers of renal damage like BUN, serum creatinine. The study was conducted in M.S. Ramaiah Medical College and approved by institutional ethical committee board. Patients from both sexes were included. Fasting blood samples of the patients were analysed for FBS, PPBS, HbA1c, and BUN and serum creatinine. Also 24 hour urine collection was done for the analysis of microalbuminuria by turbidometric method which is considered as more sensitive assays.

1. FBS, PPBS in blood was estimated by glucose oxidase- peroxidase (GOD- POD) method.

2. Microalbumin in urine was estimated by turbidometric method.

3. Serum Creatinine was estimated by Jaffe's method.

4. BUN by colorimetric method.

STATISTICAL METHOD

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. Student t test (two tailed, independent) has been used to find the significance of microalbuminuria (mg/lt) between controlled (HbA1c<7) and uncontrolled (HbA1c> 7) type II diabetics. Pearson correlation has been used to find the significance of relationship between microalbuminuria and study parameters in the cases.

RESULTS

In our study the prevalence of the disease is 48% with a significant p value of 0.004 (Table 1). Also the study showed a positive correlation of microalbuminuria with FBS (p = 0.0001) and PPBS (p= 0.005) (Table 2). The study did not show significant correlation with age, disease duration and HbA1c. However a significant correlation of microalbuminuria was observed with) serum creatinine (0.0001) (Table 3) and BUN (p= 0.009 (Table 4). Further microalbuminuria was elevated in uncontrolled (HbA1c> 7) type II diabetics than controlled (HbA1c<7) diabetics but it is not statistically significant.

Table 1 - Prevalence for the Present Study

MA							
	N	**%**		**Mean**	**SD**	**Independent t Test**	**P Value**
Normal	52 [0 - 15]	52.0		7.22	3.89	2.988	0.004 **
Abnormal	48 [> 15]	48.0		426.77	1012.94		

Table 2- Relationship of FBS, PPBS with MA

Correlation between FBS and MA					
	N	**Mean**	**SD**	**Pearson Correlation [r]**	**P Value**
MA	100	208.606	729.044	0.362 [Moderate +ve Correlation]	0.0001 ***
FBSS	100	158.466	57.686		

Correlation between PPBS and MA					
	N	Mean	SD	Pearson Correlation [r]	P Value
MA	100	208.606	729.044	0.277 [Low +ve Correlation]	0.005 **
PBSS	100	233.929	81.705		

Table 3- Correlation between MA and Serum Creatinine

Correlation between Serum Creatinine and MA					
	N	Mean	SD	Pearson Correlation [r]	P Value
MA	100	208.606	729.044	0.455 [Moderate +ve Correlation]	0.0001 **

Table 4- Correlation between MA and BUN

Correlation between BUN and MA					
	N	Mean	SD	Pearson Correlation [r]	P Value
MA	100	208.606	729.044	0.261 [Low +ve Correlation]	0.009 **
BUN	100	12.759	7.305		

DISCUSSION

Diabetic nephropathy has become the most common single cause of end-stage renal disease (ESRD)all over the world[6]. The first clinical sign of renal dysfunction in patients with diabetes generally is microalbuminuria a sign of endothelial dysfunction that is not necessarily confined to the kidney. Microalbuminuria develops in 2 to 5 percent of patients of type 2 diabetes per year[7,8]. The present study assessed the prevalence of microalbuminuria in type II diabetes mellitus a strong predictor of nephropathy [9]and ESRD. As the duration of diabetes progresses in untreated patients it leads to numerous microvascular complication one of them being nephropathy. Thus diabetic nephropathy progresses gradually and accounts for about 40% of ESRD.

Most of the studies reveal that, diabetic patients do not present with well developed clinical manifestation of nephropathy[10]. However the same studies have proven significant microalbuminuria in these patients [5,11]. Thus the magnitude of damage caused by the microvascular complication of diabetes stress needs a sensitive marker for screening nephropathy. And this sensitive marker has known to be the estimation of microalbumin excretion in the urine[12,13]. According to WHO, the prevalence rate of nephropathy after 15 years of diabetes ranged between 17.7 and 56.6% in men and between 11.1 and 71% in women. Increased protein excretion may be an early clinical manifestation of diabetic nephropathy[14,15,16].In other studies the prevalence rate

of microalbuminuria was 34% and 27.2% [3,17]. In our study the prevalence rate is 48% which was found to be statistically significant. However the variation in the prevalence range could be due to a difference in the patient selection criteria and different estimation technique. Further proteinuria independently associates with coronary heart disease in patients with diabetics and reflects not only renal impairment but a key pathogenic element of generalised vascular damage.Gene polymorphism of angiotensin converting enzyme has known to be associated with diabetic nephropathy[18]. Thus pathogenesis appears to involve complex interactions between genetic and environmental factors[19]. The patho-physiologic basis for elevated urinary albumin excretion entails the binding of glucose to proteins resulting in excessive protein glycosylation with the build-up of advanced glycated end products. This leads to deposition of advanced glycated end products on the glomerulus resulting in renal and glomerular hypertrophy, mesangial matrix accumulation and thickening of glomerular basement membrane. This abnormality permits the leakage of low molecular weight proteins [albumin][20]. As the diabetic nephropathy progress in early stage no clinical signs and symptoms of glomerular changes are seen. Thus the onset can be diagnosed by screening for microalbuminuria.

High sugar levels for long duration causes microvascular complication like retinal damage leading to loss of vision (retinopathy), sensory nerve damage (neuropathy) and irreversible kidney

damage (nephropathy). Since microalbuminuria is an early indicator of nephropathy, its prevalence rate was assessed in our study and was correlated with other markers of kidney damage like BUN and serum creatinine. Also in our study, microalbuminuria showed a significant positive correlation with both fasting and post prandial hyperglycaemia, which means that as the sugar levels raised the microalbumin excretion in urine also increased. This goes in accordance with previous studies [14]. In this study, no positive correlation was seen between microalbuminuria and age when compared to other studies wherein the levels were higher in older age group[3,6]. However male patients (69%) have been found to be more susceptible to microalbuminuria as compared to female patients (31%) similar to the previous studies[4]. Further no positive correlation between microalbuminuria and duration of disease was established, as compared to other studies where the levels were higher in patients with the longer duration of disease [21,22]. Also the study did not show positive correlation between microalbuminuria and HbA1c when compared to previous study [12].

Previous studies have shown a significant elevation of microalbuminuria in uncontrolled type II diabetics (HbA1c> 7) than controlled type II diabetics (HbA1c<7)[23]. However in our study the levels were higher in uncontrolled diabetics when compared to normals but it was not statistically significant.

Over the last few years, the association between microalbuminuria and cardiovascular events has been established. A strong relation of microalbuminuria, raised serum creatinine levels and presence of cardiac and vascular hypertrophy explain the excess morbidity and mortality rates observed in patients with renal dysfunction. This supports the role of the kidneys as an integrated sensor of cardiovascular risk[24]. In this study also a significant positive correlation was seen between microalbuminuria and serum creatinine in accordance with previous study[25]. Also a linear correlation between BUN levels and prevalence of microalbuminuria was observed in this study. It is interesting to note that increase in urea may increase prevalence of microalbuminuria in diabetic patients.

CONCLUSION

Our study has found a significant prevalence of microalbuminuria in type II diabetics indicating subclinical damage of microvasculature, which is the predictor of development of diabetic nephropathy. Further as Microalbuminuria showed a positive correlation with FBS, PPBS, Serum creatinine and BUN it is the marker of choice for the detection of renal involvement in patients with diabetics. Hence, it is recommended that microalbuminuria test should be a part of routine check-up forDM. Further this alerts the physician to take precautionary measures for renal damage by timely administration of treatment strategy and correction of risk factor.

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Median Nerve Conduction Velocity as a Tool to Detect Subclinical Neuropathy in Type II Diabetes Mellitus

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ABSTRACT

Background: Diabetes mellitus is a metabolic disorder, which has become a major health challenge worldwide. Diabetic neuropathy is most commonly occurring microvascular complication. It has a long asymptomatic stage which is accelerated by poor glycemic control. Nerve conduction study has become an important non-invasive tool for screening of nerve lesion in subclinical stages. **Objectives:** To assess median nerve velocity and its association with duration of diabetes, body mass index and glycemic control. **Method :** Present study was conducted in Osmania Medical College Hospital, Hyderabad. Fifty type II diabetes mellitus patients with history of diabetes for 1-10 years. They were compared with 50 age & gender matched healthy individuals. Blood sugar & glycated heamoglobin (HbA1c) was estimated followed by nerve conduction study. **Results:** Data was analysed statistically using unpaired students t-test and Chi square test. 'p' value less than 0.05 was considered significant. Nerve conduction velocity progressively decreased in diabetic group. There is negative correlation between sensory nerve conduction velocity & glycemic control. **Conclusion :** Present study suggests that there is progressive slowing of sensory nerves in diabetics which is accelerated by poor glycemic control. With proper glycemic control the motor nerve changes and complications of sensory disturbances can be prevented.

Keywords: *Diabetes Mellitus, Glycated hemoglobin (HbA1c), Neuropathy, Nerve conduction velocity.*

INTRODUCTION

Diabetes mellitus is a global problem. Its prevalence is growing rapidly worldwide and is reaching epidemic proportions. According to the International Diabetes Federation (IDF), India has more diabetic patients in the world, so it is called Diabetic capital of the world. In 2013 there were 67.1 million diabetics in india which is likely to to be double by 2030[1].

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Diabetes mellitus (DM) is a metabolic disorder, characterized by hyperglycemia due to absolute or relative deficiency of insulin. Type I DM also called as insulin dependent diabetes mellitus (IDDM), is due to autoimmune mediated destruction of β cells of the pancreas, resulting in absolute deficiency of insulin secretion, whereas type II DM, non-insulin dependent diabetes mellitus (NIDDM), is caused by decreased sensitivity of the target tissue to the metabolic effect of insulin. Diabetes mellitus has long-term complications like neuropathy, retinopathy, nephropathy and vasculopathy[2].

Neuropathies include peripheral neuropathies, polyneuropathies, mononeuritis multiplex & autonomic neuropathy[3]. Peripheral neuropathy is a common complication & affects up to 50% of type II diabetic patients[4]. Mononeuropathies may involve peripheral nerves like median, ulnar, peroneal, sural,

sciatic and femoral nerves or cranial nerves III,IV,VI and VII[5].

Median nerve has highest electro-diagnostic abnormalities in diabetic patients with subclinical neuropathy[6]. Stambolius E et al found that in asymptomatic diabetic patients, median nerve mononeuropathy was 18.1%[7]. Median mononeuropathy may be caused by metabolic factors like hyperglycemia making it more susceptible to entrapement in carpal tunnel and increased incidence of vasculitis causing hypoxia leading to nerve infarction[8]. Sulaiman A et al showed that decrease in nerve conduction velocity before other parameters (like amplitude), might be due to demyelinating nature of the diabetes mellitus[3]. As peripheral nerves have capability to regenerate, early diagnosis and timely therapeutic intervention will reduce morbidity and mortality[9].

Nerve conduction studies are sensitive, reliable and non-invasive technique to measures the nerve conduction. Hence, present study was done to assess efficacy of median nerve conduction velocity as a non-invasive tool in asymptomatic type II diabetes mellitus patients.

MATERIALS & METHOD

Present study was conducted in Osmania Medical College Hospital , Hyderabad after taking approval from ethical committee, from January 2014 to June 2014. Fifty type 2 diabetes mellitus patients (as per American Diabetic Association guideline) between 40-50 years, with history of diabetes for 1-10 years (on oral hypoglycemic agents), were compared with 50 age & gender matched healthy individuals. Those who had duration of diabetes more than 10 years, H/O acute diabetic complications, hypertension, alcoholism, smokers, endocrinal disorders, neuromuscular disorder & pregnant women were excluded from study.

All patients were explained in detail about study and written consent was taken. A detailed history and examination was done. Height was measured, with an accuracy of 0.5cm.Weight was measured, up to nearest 100 gm. Body mass index (BMI) (Quetelet index) was calculated as weight in kilograms/height in square meters. According to WHO, normal BMI ranges from 18.5 to 24.9 kg/m^2. BMI between 25-

29.9 kg/m^2 is overweight, while a BMI > 30 kg/m^2 is considered obese.

With fasting of 8 hours, under all aseptic precautions 4-5 ml of blood was collected and analysed for fasting blood sugar, HBA1c. Postprandial blood sample (PPBS) was taken 2 hours after meals with appropriate reagent using semi-auto analyzer by enzymatic method.

As per American Diabetes Association 2014[10] the latest recommendations for diagnosis of diabetes mellitus are as follows HBA1c ≥6.5% or Fasting blood glucose (FBG) ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL during an oral glucose tolerance test or a random plasma glucose ≥200 mg/dL, in patients with classic symptoms of hyperglycemia or hyperglycemic crisis.

Median nerve conduction velocity test was done using Viking select under standard techniques of supramaximal percutaneus stimulation with a constant current stimulator and surface recording electrode.

For motor component evaluation, ground electrode was placed over dorsum of the hand, between stimulating and recording electrodes. The active electrodes was placed over the motor point of the abductor pollicis brevis. The reference electrode was placed 3 cm distal over the 1st metacarpo-phalangeal joint. With surface electrodes, distal stimulations were given 3 cm proximal to distal wrist crease between flexor carpi radialis and palmaris longus tendon.

For sensory component evaluation, antidromic stimulation was done at wrist between palmaris longus and flexer carpi radialis tendon at 2nd distal crease. Ground electrode was placed over dorsum of the hand. Recording electrodes used were ring electrodes.The active ring electrodes was placed around proximal inter-phalangeal joint. The reference ring electrode around distal phalanx of second digit.

Stimuli was applied at two different sites along the nerve and the latency of the E.M.G. response was measured, the difference between these is the time taken for action potentials to travel along the nerve between the two stimulus points[11]. The distance between the points of stimulation was measured &

Conduction velocity was calculated by formula,

Nerve conduction velocity (m/s) = Distance (D)/ difference in latent periods (T)
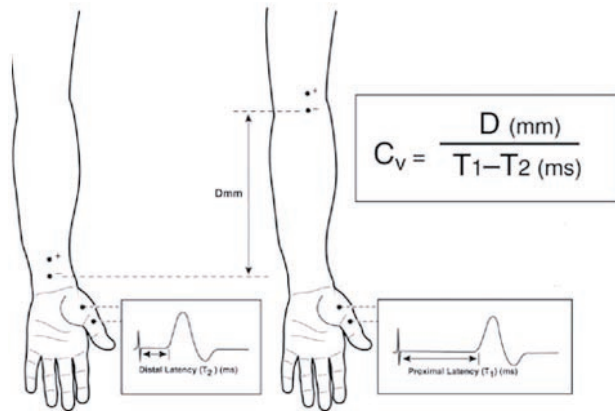
Figure: 1 Motor nerve conduction velocity (MNCV) of median nerve
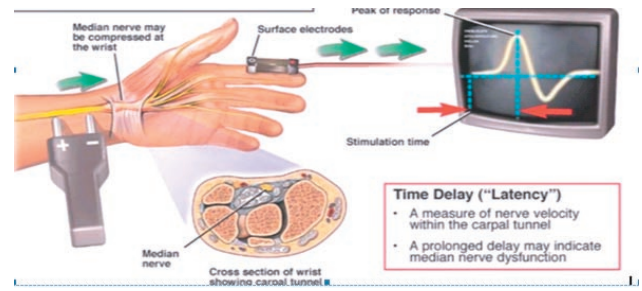
Figure: 2 Sensory nerve conduction velocity of median nerve (SNCV) across carpel tunnel.

STATISTICAL ANALYSIS

All the parameter were expressed as mean and standard deviation(mean ±SD). They were tabulated in microsoft excel sheet, Statistical analysis was done using SPSS version18. Data were compared using unpaired students t-test and Chi square test. 'p' value less than 0.05 was considered significant.

RESULTS

The mean age of study group (48.32 ± 3.2 years) was significantly higher (p < 0.05) than control group (42.87 ± 2.9 years). Weight & BMI were significantly higher in study group (Table 1).

Table- I : Comparison of demographic data in diabetic and control subjects (N=100)

S.No	Parameters	Diabetics (n=50) Mean ± SD	Controls (n=50) Mean ± SD	p value
1	Age (years)	48.32 ± 3.2	42.87 ± 2.9	< 0.05
2	Height (cms)	162.32 ± 6.04	161.1 ± 4.42	> 0.05
3	Weight (kg)	65.76 ± 7.82	56.63 ± 9.38	< 0.05
4	BMI (Kg/m^2)	25.68 ± 5.06	21.85 ± 7.54	< 0.05

'*p*' value: <0.05 – significant.

Table- II : Comparison of age wise distribution of subjects in both groups (N=100)

S.No	Gender	Diabetics(n=50)	Controls(n=50)	p value
1	Male	30	29	> 0.05
2	Female	20	21	> 0.05

'*p*' value: <0.05 – significant.

Table- III : Comparison of Blood Sugar & Glycosylated Hemoglobin Levels (N=100)

S.No	Blood sugar levels	Diabetics(n=50) Mean ± SD	Controls(n=50) Mean ± SD	p value
1	FBS (mg/dl)	112.32 ± 12.16	84.92 ± 7.53	< 0.05
2	PPBS (mg/dl)	191.52 ± 21.52	121.04 ± 4.36	< 0.05
3	HbA1c (%)	6.67 ± 0.46	5.32 ± 0.51	< 0.05

'*p*' value: <0.05 – significant.

Table- IV: Comparison of MNCV and SNCV in diabetics and control groups (N=100)

S.No	Parameters	Diabetics(n=50) Mean ± SD	Controls(n=50) Mean ± SD	p- value
1	MNCV(m/s)	52.15±4.92	57.13±4.27	<0.05
2	SNCV(m/s)	51.16±5.12	57.33±4.26	<0.05

p value <0.05- significant

It is observed that, there is decrease in motor & sensory nerve conduction velocity in diabetics as compared to control groups, which is statistically significant (p <0.05).

Table-V: MNCV according to duration of diabetes Mean ± SD (n=50)

S.No	Group	Duration of diabetes (in years)	MNCV(m/s)	p- value
1	I (n= 32)	1-5	54.67±3.91	<0.05
2	II (n=18)	5-10	49.71±3.23	

p value <0.05- significant

Table –VI: SNCV according to duration of diabetes Mean ± SD (n=50)

S.No	Group	Duration of diabetes (in years.)	SNCV(m/s)	p- value
1	I (n= 32)	1-5	53.56±3.87	<0.05
2	II (n=18)	5-10	46.68±2.93	

p value <0.05- significant

Table-VII: Comparison of Nerve conduction velocity with HbA1c Levels in diabetics. Mean ± SD (n=50)

S.No	Parameters	HbA1c (5-6%)	HbA1c (> 6%)	p- value
1	MNCV(m/s)	52.82±3.76	51.48±2.19	>0.05
2	SNCV(m/s)	53.73±2.83	48.36±3.71	<0.05

p value <0.05- significant

Thus, there is progressive decrease in motor & sensory nerve conduction velocity with increase in the duration of diabetes, also, it is significantly associated with increased HbA1c levels.

DISCUSSION

Diabetes represents a spectrum of metabolic disorder, which has become a major health challenge worldwide. The unprecedented economic development and rapid urbanization in Asian countries particularly India has led to shift in health problems from communicable to non-communicable diseases[12]. Type 2 diabetes may occur at any age, but as it is mainly diagnosed after 40 years, present study was done in diabetics between 40-50 years. The incidence of type 2 DM is also increasing with the increase in age, physical inactivity and sedentary life style.

The mean BMI in study group and control group was 25.68 ± 5.06 Kg/m^2 and 21.85 ± 7.54 Kg/m^2 respectively which was statistically significant which is similar to study by K. Munisekhar et.al [13]. Thus obesity increases the risk of diabetes.

In present study, FBS, PPPS & HbA1c levels were higher in diabetics compared to control and

which were statistically significant. HbA1c is established marker of glycemic control of past 6-8 weeks. It represents integrated values of blood glucose of approximately to half life of RBC i.e.6-8 weeks (average life span 120 days). Formation of glycosylated haemoglobin is irreversible & its rate of formation is diretly proportional to blood glucose level. It is free of day to day glucose fluctuations , recent exercise or food ingestion. Normal HbA1C concentrates about 5 gm% . Increase in HbA1c as seen in present study is similar to study by Abida Farheen[11] & Munisekhar et al[13] .

In present study there was significant decrease in both motor and sensory nerve conduction velocity in the median nerve of the diabetic patients as compared to control group. Neuronal involvement in diabetics is accelerated by poor glycaemic control. Elevated HbA1c levels indicate improper metabolic control which causes intracellular hyperglycemia. This increased blood glucose causes chemical changes in nerves and damages blood vessels that carry oxygen and nutrients to the nerves. Excessive glucose metabolism decreases nitric oxide (NO) that dilates blood vessels, this may lead to constriction of blood vessels supplying the nerve leading to decreased perfusion which causes endoneural hypoxia. These changes occur well before pathological changes such as basement membrane thickening.

Uncontrolled hyperglycemia, activates the enzyme aldose reductase & increases formation of sorbitol, which is neurotoxic and this in turn reduces cellular Na-K ATPase which results in decreased nerve conduction. Also it results in competitive inhibition of the sodium-dependent transport responsible for myo-inositol uptake. Therefore there is decreased myo-inositol in peripheral nerves. Our study is in accordance with studies by Arvind A et al[14], Garg R et al[15] & Tupkovic E et al[16] which have shown negative correlation between HbA1c and NCV. Therefore aggressive management of hyperglycemia is an important strategy to prevent the occurrence of neuropathy in diabetes. On contrary, DCCT trial and Sosenko et al[17] found no correlation between HbA1c levels and peripheral neuropathy.

In present study, decrease in nerve conduction velocity was more in sensory nerves as compared to motor nerves. Munisekhar et al[13] also concluded

samething. This difference in sensory and motor nerve conduction may due to their diameter and myelination. According to Erlanger and Gasser classification of motor nerves are classified under A⊛. Most of sensory nerves are Aβ and Aδ whose diameter are less. Therefore in diabetes mellitus sensory nerves are affected first. So patients have symptoms of numbness, tingling and decreased sensation[18].

Further both motor and sensory nerve conduction velocity decreased with the increase in the duration of diabetes mellitus. Findings are consistent with Albers et al[19]. But Fraser et al found no relationship between onset of neuropathy and duration of diabetes[20].

Thus risk for neuropathy increases both with duration and severity of hyperglycemia[13-15].

Therefore estimation of both nerve conduction velocity and HbA1c levels is helpful in identifying the risk category for diabetic neuropathy .

As there is a strong association between polyneuropathy, duration of diabetes & level of HbA1c, near normal glycemic control delays the beginning or progression of neuropathy[6,9].

As peripheral nerves have capability to regenerate, early diagnosis and timely therapeutic intervention will reduce morbidity and mortality in diabetes mellitus[2].

CONCLUSIONS

From present study, we conclude that there is a significant decrease in the sensory nerve conduction velocity in patients with type II diabetic mellitus. There is also progressive decline in sensory conduction velocity with duration of the disease. There is a negative correlation between HbA1c and nerve conduction which indicates that poor metabolic control causes early onset and rapid progression of neuropathy. Therefore nerve conduction study & HbA1c can be used as a screening tool to diagnose neuropathy in subclinical stages

As peripheral nerves have capability to regenerate. Aggressive glycaemic control reduced early and late diabetic complications, motor nerve damage and complications related to sensory disturbance can be prevented. Therefore patients

should be counseled for aggressive glycemic control by life style modification, diet & medications

RECOMMENDATIONS

We recommend further larger multicentric studies are required to confirm results of present study. In developing countries like india, The maintenance of traditional dietary and living pattern should get high priority in the national health care programme.

Ethical Clearance - Taken from Institutional Ethical Committee

Conflict of Interest - Nil

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Heart Rate Variability(HRV) in Normotensive Subjects with Family History of Hypertension

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ABSTRACT

Aim: The study is aimed to find out the early changes in the cardiac autonomic modulation by analyzing Frequency and Time domain measures of Heart rate variability among normotensive subjects with family history of hypertension.

Objectives: To compare HRV between subjects with family history of hypertension and subjects without family history of hypertension.

Method: 40 Normotensive male subjects between the age group of 18-25 years with family history of hypertension(either one parent or both the parents) were selected as study group and 40 Normotensive male subjects between the age group 18-25 years without family history of hypertension were selected as controls.The study was carried out in Electrophysiology laboratory of Physiology department in Osmania Medical College.Baseline blood pressure was measured using sphygmomanometer and height in meters and weight in kgs were measured and BMI calculated.Each subject was made to relax in supine position and ECG was recorded for 10 minutes in lead I using Power lab data recording system,AD instruments and analyzed by lab chart software. HRV was analyzed using frequency domain measures like Low Frequency in normalisedunits(LFnu),High Frequency in normalized units(HFnu) and ratio of Low frequency to High frequency(LF/HF), and time domain measures like Standard deviation of NN interval(SDNN),Root mean square successive Differences between the intervals (RMSSD).

Results: Statistical analysis was done using Unpaired t-test.There was a significant increase in frequency domain parameters like LFnu and LF/HF(P<0.001) and a significant reduction in HFnu in study group(P<0.001) compared to controls.Time domain parameters like SDNN and RMSSD were significantly reduced in study group(P<0.01) compared to controls.

Conclusion: Cardiac autonomic imbalance in the form of increased sympathetic activity and decreased parasympathetic activity was found in study group compared to controls.

Keywords: Heart rate variability, hypertension, LFnu,HFnu.

INTRODUCTION

Hypertension (HTN)(chronic elevation of blood pressure) is a major silent disease affecting young people because of their hereditary and modern lifestyles. Target organ damages occur before overt hypertension is diagnosed.The adverse effects of hypertension principally involve the blood vessels, retina, heart and kidney including central nervous system[1].Hypertension is a chronic condition which doubles the risk of cardiovascular disease including coronary artery disease,congestive heart failure,ischaemic and hemorrhagic stroke, renal failure and peripheral arterial disease.

Hypertension is ranked as the third most important risk factor for attributable burden of disease in south Asia (2010)[2]. HTN is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India[2]. The WHO rates HTN as one of the most important causes of premature

death worldwide[3].

The mechanism that results in hypertension is not known in most of the individuals and the disease is multifactorial. Cause in 40-60% of individuals is explained by genetic factors. Environmental factors include high salt intake,heavy consumption of alcohol,obesity and lack of exercise[4].

Hypertension runs in families, and parental history of hypertension increases the risk of developing hypertension,especially if both the parents are hypertensive[5].

Autonomic nervous system plays an important role in regulation of blood pressure and heart rate. It is a well established fact that hypertension is associated with dysregulation of autonomic nervous system[6].

An increased sympathetic drive combined with decreased parasympathetic inhibition is found in patients with hypertension[7].

Autonomic abnormality in the form of increased sympathetic tone has been demonstrated in young normotensive offsprings of hypertensive parents[8].

Heart rate variability(HRV) is a marker of autonomic activity.It is an index of cardiac autonomic regulation[9]. It is a useful non-invasive, powerful tool for quantitative assessment of cardiac autonomic function.

Heart rate variability was recorded using power lab data recording system and analyzed by lab chart software, AD instruments.

There in an increased incidence of hypertension in young adults because of physical inactivity, high fat diet, stress, poor lifestyle, inheritance from parents and several other factors.HRV can detect the autonomic disturbances that will eventually lead to development of hypertension. So preventive measures can be undertaken to prevent hypertension.

MATERIALS & METHOD

The study was carried out in the Electrophysiology laboratory in Upgraded Department of Physiology, Osmania Medical College.

Study was conducted on 80 Normotensive male subjects from I[st] to final year MBBS of Osmania

Medical College, Hyderabad. History of hypertension in the parents of the subjects was determined. Then the subjects for the study were classified in to the following two groups, each group consisting of 40 men only.

Control group: 40 Normotensive subjects whose both parents are Normotensive.

Study group: 40 Normotensive subjects whose either one parent or both the parents are hypertensive.

Inclusion criteria (common to both control and study group):

- 18-25 years Normotensive male subjects

- nonsmokers,

- nonalcoholic and

- normal range of body mass index.(18.5 – 25 kg/m^2)

Exclusion criteria:

- Systemic disorders including overt Hypertension and diabetes mellitus

- Family history of diabetes mellitus (either one parent or both the parents)

- any acute illness

- history of any cardiovascular or cardio-respiratory disorders

All the subjects were explained about the procedure and a written informed consent was taken. Height in meters and weight in kgs were measured and BMI(Body Mass Index) calculated as per quetlet's index.

Body Mass Index $= \dfrac{weight \, (Kilogram)}{Height^2 \, (meters)}$

Subjects were made to relax in supine position and blood pressure recorded using mercury sphygmomanometer. Subjects were rested in supine position for atleast 10 minutes, after which ECG was recorded for 10 minutes in lead I.
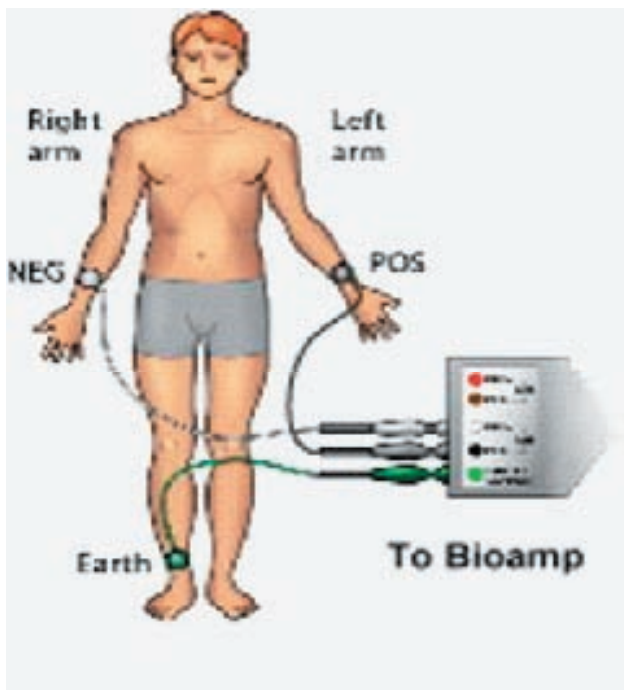
Fig.1: Position of electrodes

Equipment:

ECG was recorded using Power lab data recording system, AD instruments and analyzed by lab chart software. The Heart Rate Variability (HRV) Module (Windows) is used to analyze LabChart recordings of ECG or arterial pulse signal. HRV works online, performing calculations and displaying results as data is recording. HRV also has additional functionality to allow for offline data analysis.

The HRV module analyzes beat-to-beat interval variation in ECG recordings, it extends LabChart functionality to allow analysis and display of RR interval variation. It uses a threshold detector to detect the R component from each raw ECG waveform and generate RR Interval data. Beats are automatically distinguished by the software and classified into three groups: normal, ectopic or artifact.
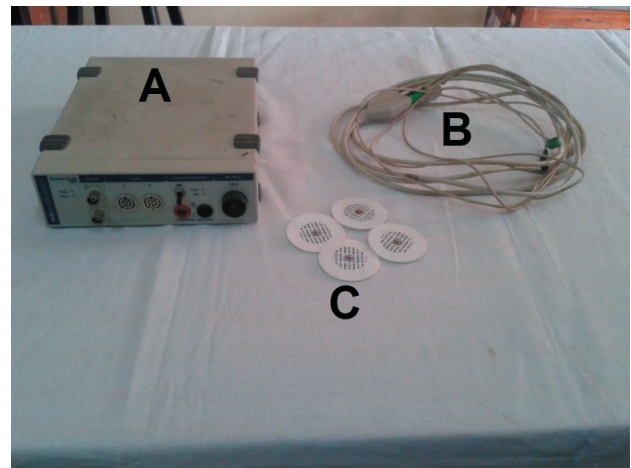
Fig.2: Instruments used for recording of HRV

A - Power Lab data acquisition hardware.

B - Lead wires connected to Bio Amps. The lead wires are 1 meter in length with 4 mm 'snap-on' connectors for use with Disposable ECG Electrodes.

C - Disposable ECG Electrodes.

Statistical Analysis:

Statistical analysis was done using unpaired t test and Microsoft excel were used.

P value <0.05 was considered as statistical significant.

The results were expressed as Mean ± Standard Deviation.

FINDINGS

Table.1: Comparison of Age, BMI, Blood pressure between study and control group

Variable	Study group		Control group		Study groups vs control group	
	Mean	SD	Mean	SD	t-value*	p-value
Age(years)	21.4	2.6	21.15	2.11	0.326	0.746
BMI(kg/m2)	21.91	2.01	21.86	1.95	0.177	0.860
Systolic BP(mmHg)	108.05	3.25	108.95	2.64	1.359	0.178
Diastolic BP(mmHg)	70.6	1.87	70.05	1.53	1.434	0.156

* Unpaired t test

Table.2: Comparison of Time domain measures between study and control group

Variable	Study group		Control group		Study group vs control group	
	Mean	SD	Mean	SD	t value*	P value
SDNN(ms)	49.92	12.12	57.96	11.57	3.033	**0.003**
RMSSD(ms)	29.5	7.93	34.5	11.2	2.302	**0.024**

Table.3: Comparison of Frequency domain measures between study and control group

Variable	Study group		Control group		Study group vs control group	
	Mean	SD	Mean	SD	t value*	P value
LF n.u	63.62	5.85	49.94	8.91	8.111	**0.000**
HF n.u	24.11	4.28	28.69	5.56	4.121	**0.000**
LF/HF ratio	2.72	0.56	1.84	0.41	7.978	**0.000**

RESULTS

On analysis of study group, the mean age (years) was 21.4 ± 2.6; the mean systolic blood pressure (mmHg) was 108.05 ± 3.25; the mean diastolic blood pressure (mmHg) was 70.6 ± 1.87; the mean BMI (Kg/m2) was 21.91 ± 2.01.

On analysis of control group, the mean age (years) was 21.15 ± 2.11; the mean systolic blood pressure (mmHg) was 108.95 ± 2.64; the mean diastolic blood pressure (mmHg) was 70.05 ± 1.53; the mean BMI (kg/m2) was 21.86 ± 1.95.

Time domain analysis:

Standard deviation of NN interval (SDNN)(ms):

Mean SDNN in study group was 49.92 ± 12.12 and in control group it was 57.96 ± 11.57. SDNN was **significantly reduced** in study group compared to control group $(p<0.01)$

Root mean square successive Differences between the intervals (RMSSD)(ms):

Mean RMSSD in study group was 29.5 ± 7.93 and in control it was 34.5 ± 11.2. There was a **significant reduction** in study group compared to control group $(p<0.01)$.

Frequency domain analysis:

Low Frequency in normalized units (LF n.u):

Mean LF in study group was 63.62 ± 5.85 and in control group it was 49.94 ± 8.91. There was a **highly significant increase** in study group compared to control group $(p < 0.001)$.

High Frequency in normalized units (HF n.u):

Mean HF in study group was 24.11 ± 4.28 and in control group it was 28.69 ± 5.56. There was a **highly significant reduction** in study group compared to control group $(p< 0.001)$.

LF/HF ratio:

Mean LF/HF ratio in study group was 2.72 ± 0.56 and in control group it was 1.84 ± 0.41. There was a **highly significant increase** in study group compared to control group $(p < 0.001)$.

CONCLUSION

The conclusions of this study are:

1. There was a significant reduction in Time domain parameters like SDNN and RMSSD in normotensive subjects with family history of hypertension indicating decreased parasympathetic activity.

2. Also there was significant increase in LF(n.u) in normotensive subjects with family history of hypertension indicating increased sympathetic activity.

3. Significant decrease in HF(n.u) in normotensive subjects with family history of hypertension suggesting decreased parasympathetic activity.

4. Significant increase in LF(n.u)/HF(n.u) ratio in normotensive subjects with family history of hypertension indicating an increase in sympathetic activity and a decrease in parasympathetic activity.

5. Cardiac autonomic imbalance in normotensive offspring of hypertensive parents is due to predominance of sympathetic activity and a decrease in vagal tone.

6. This study concluded that HRV analysis should be done in young adult offspring of hypertensive parents to detect any autonomic imbalance.

DISCUSSION

The main objective of the study was to assess heart rate variability in normotensive subjects with family history of hypertension. It is known that hypertension is a multisystem disorder that affect many organs of the body including cardiovascular system. It is the most prevalent non communicable disorder in the world. It is a big concern because of the devastating effects of its chronic complications.

With a growing problem of hypertension worldwide, there is a concern that hypertension in young adults may also be on the rise and that cases are not detected because of inadequate screening at this age group. At the same time, the diagnosis of hypertension is known to be a problem in the young as a result of white coat hypertension, where systolic and diastolic blood pressures may be elevated at the time of measurement[10]. Repeat testing, home blood pressure measurement and ambulatory monitoring are sometimes required to distinguish this group from the true hypertensives[11].

Normotensive subjects with family history of hypertension have greater sympathetic activity and also early parasympathetic attenuation[12].It has been observed that young normotensive offspring of hypertensive parents exhibit several abnormal characteristics like being overweight[13], elevated basal blood pressure and produce exaggerated blood pressure response to exercise[14]. An assessment of cardiac autonomic functions may be of prognostic value in such individuals.

HRV analysis has the ability to assess overall cardiac health and the state of the autonomic nervous system (ANS) responsible for regulating cardiac activity. It is a useful signal for understanding the status of the ANS[15].Therefore in this study HRV analysis was done and compared between young normotensive subjects with family history of hypertension and young normotensive subjects without family history of hypertension. As HRV analysis detects autonomic imbalance, the altered sympathovagal balance may be an early marker of increased cardiovascular responsiveness in subjects with genetic predisposition to hypertension. So if detected earlier, preventive measures can be undertaken to prevent prehypertension and subsequently hypertension in them. Thus this study was undertaken with the above mentioned objective.

Spectral analysis of HRV shows several frequency bands, two of which are important here: low frequency component (LF; 0.04-015 Hz) mediated by both PNS and SNS, and a high frequency component (HF ; 0.15-0.4 Hz) mediated by PNS activation. As a result, the ratio of LF to HF power is used as an index of autonomic balance[16].

Frequency domain methods are preferred to time domain methods when short-term recordings are investigated. Although the time domain methods, especially the SDNN and RMSSD can be used to investigate recordings of short durations. The frequency domain methods are usually able to provide results that are more easily interpretable in terms of physiological regulations.

This study showed that Cardiac autonomic imbalance in normotensive offspring of hypertensive parents is due to predominance of sympathetic activity and a decrease in vagal tone.

Conflict of Interest: None

Source of Funding – Self

Ethical Clearance– Taken from Scientific Ethical committee, Osmania Medical College, Koti, Hyderabad, Telengana.

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To Correlate the Difference between Slow Vital Capacity and Forced Vital Capacity with the Severity of Chronic Obstructive Pulmonary Disease

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ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is characterized functionally by a decrease in maximal or forced expiratory flow rates. In addition patients with COPD have uneven ventilation, which result in arterial hypoxemia and hypercapnia. Various pulmonary function tests are available to detect lung diseases as well as grading the severity of the diseases using Spirometer, which can include both quiet and forced Vital Capacity maneuver. The Forced Vital Capacity (FVC) is lower than the Slow Vital Capacity (SVC) even in normal individuals and in obstructive patients. In obstructive patients, the difference between the FVC and the SVC increases with the degree of obstruction. Hyperinflation in patients with airway obstruction is determined by the degree of obstruction and by the difference in the vital capacity between forced and slow maneuvers. In clinical settings, FEV1 percent is commonly used to assess the severity of COPD. This study was done to correlate the SVC – FVC difference with severity of the COPD. **Materials and Method:** This study was carried out in two groups with 30 in each group, Group A as controls and Group B with established COPD patients. Group B were again subdivided into Mild subgroup, Moderate subgroup and Severe subgroup depending on their FEV1 % which is commonly used to assess the severity of COPD. Pulmonary function tests parameters (mainly FEV1%, FEV1/FVC%, SVC, FVC) were assessed by Spirometer. **Conclusion:** The difference between Slow Vital Capacity and Forced Vital Capacity was increased significantly with increasing severity of COPD. Slow vital capacity and forced vital capacity difference can be used as the predictor of severity of COPD.

Kewords: *COPD, SVC, FVC, FEV1, Severity.*

INTRODUCTION

COPD is defined by American thoracic society as a disease state characterized by the presence of airflow obstruction secondary to chronic bronchitis or emphysema. It is characterized by airflow limitation that is not fully reversible or not more than 15% with a dose of bronchodilator. Airflow limitation is usually both progressive and associated with an abnormal inflammatory response of lungs

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to noxious particles or gases. Major risk factors for COPD are cigarette smoking, occupational exposure, and indoor air pollution [1].Most patients with COPD have features of both emphysema and chronic bronchitis. Airflow limitation and increased airway resistance are caused by loss of elastic recoil due to emphysema, by increased collapsibility of small airways, through loss of radial traction on airways, or to increased resistance due to intrinsic narrowing of small airways[2]. In chronic bronchitis, small airway narrowing causes a decrease in ventilation of their distal alveolar acini and if alveolar capillaries remain intact; this results in mismatching of ventilation and Blood flow, leading to reduced ventilation – perfusion ratio. Various pulmonary function tests are available to detect lung diseases as well as grading the severity

of the diseases. Spirometer, which can include both quiet and forced VC maneuver, is the most common and useful of the lung function tests. The volume expired in the first second is expressed either as an absolute volume (FEV1) or as a percentage of the forced vital capacity (FEV1/ FVC %). These FEV1 percent (percentage of obtained FEV1 / predicted FEV1) is used to grade the severity of COPD, because the decrease FEV1 is a good indicator of degree of obstruction. Usually FEV1/ FVC ratio is less than 70% in COPD patients [3].

Reductions in FEV1 and FEV1/ FVC percent are the characteristic physiological abnormalities of COPD. In contrast to asthma, the reduced FEV1 in COPD seldom shows huge responses to inhaled bronchodilators[4,5]. This is called irreversibility of airway obstruction. This is the main differentiating point between asthma and COPD. The FVC is lower than the SVC even in normal individuals and in obstructive patients. In obstructive patients, the difference between the FVC and the SVC increases with the degree of obstruction. Hyperinflation in patients with airway obstruction is determined by the degree of obstruction and by the difference in the vital capacity between forced and slow maneuvers [6]. This study was done to correlate the SVC – FVC difference with severity of the COPD.

MATERIALS & METHOD

This study was conducted in the Institute of physiology and experimental medicine in collaboration with Department of thoracic medicine, Madras Medical College, Chennai. Total number of subjects included in the study was 60. They were divided into group A and group B of 30 each. The group B consists of 30 well established diagnosed COPD patients as (study group, n =30) and same age, height and weight matched healthy volunteers were recruited as group A (controls, n = 30). Group B were again subdivided into Mild subgroup, Moderate subgroup and Severe subgroup depends upon their FEV1 % by ATS staging of COPD [7] which is used commonly to assess the severity of COPD.

ATS staging of COPD [7]

Stages	Stage I	Stage II	Stage III
FEV1 (predicted)	≥50%	36 to 49 %	≤35 %

Normal healthy volunteers were recruited from Master Health check up scheme. Healthy status was assessed by a systematic medical interview, general physical examination and normal pulmonary function tests and laboratory tests.

Inclusion criteria for Group A (controls) are Males of 40-60 years of age, Weight 50-70Kgs, Height 150-170cm, No history of smoking, Used to normal physical activity, FEV1 84-120 % 0f predictive value. Exclusion criteria for Group A (controls) Females, Smokers, Any form steroid usage, Any known diseases Example Cardiac diseases, renal diseases, liver diseases, etc,. Inclusion criteria for group B (patients) Males of 40-60 years of age, Weight 50-70Kgs, Height 150-170cm, history of smoking more than 5 years and 5 Packets/ day, Clinically stable for more than 4 months from the last exacerbation, FEV1 18- 76% of predictive value and not reversible. Females, Chronic disorders like Cardiac diseases, Diabetes mellitus, Renal disorders, Endocrine disorders, COPD with complications like right heart failure, any form of steroid intake were excluded from the group B (patients). Written consent was obtained from both COPD patients and healthy volunteers. The proposal was approved by the Ethical committee of Madras medical college. Both groups-A and group-B, individuals were subjected to the Pulmonary function test using spirometry of (Super Spiro, U.K) real time flow loop spirometry machine before and after salbutamol inhalation. Spirometry was performed in all the people selected for study both before and after inhalation of bronchodilator (400 μg of inhaled Salbutamol). Those with post Bronchodilator FEV1/FVC ratio less than 70% and FEV1% reversibility less than 15 % were selected for study and labeled as COPD patients. Those with post bronchodilator FEV1/FVC ratio more than 70% were labeled as controls. Those with FEV1% reversibility more than 15% were excluded from this study (as they were asthmatics). All parameters were checked for normality of distribution. Differences between COPD patients (Group B) and healthy control group (Group A) were assessed accordingly. Comparison between control and patients was done by using one way ANOVA F- test.

RESULTS

Table 1-Comparison of different variables between groups using One way ANOVA

Variable	Group A Normal People n= 30 Mean ± SD	Group B- COPD Patients n = 30			F value	p value
		Mild n = 15 Mean ± SD	Moderate n = 6 Mean ± SD	Severe n = 9 Mean ± SD		
Age (Yrs)	49.77 ± 6.13	50.4 ± 5.32	52.67 ± 6.83	50.78 ± 7.2	0.38	0.76*
Height (cm)	160.37 ± 5.79	160.53 ± 6.58	159.5 ± 6.28	164.44± 4.12	1.32	0.28*
Weight (Kg)	61.03 ± 4.85	61.47 ± 4.86	58.83 ± 6.24	58.33 ± 4.09	1.13	0.34*
Mean FEV1%	93.7	61.4	42.17	29.67	-	-
SVC- FVC Difference (litre)	0.017 ± 0.02	0.206 ± 0.23	0.411 ± 0.08	0.71 ± 0.34	38.9	0.001#

(* Not Significant ; # Highly Significant ; SD- Standard Deviation)

Table 2-Correlation between SVC-FVC difference and FEV1% in patients

Parameter	Result
FEV1% (n = 30)	Pearson Correlation ' r ' value = - 0.93 (Highly Negative Correlation) p Value = 0.000 (Highly Significant)

In table 1 shows Group B(study group) age, height, weight matched with the healthy volunteers were recruited as Group A(control group) and also SVC –FVC difference progressively increases with severity of COPD which is statistically highly significant with p value 0.001.

In table 2 shows that correlation between SVC- FVC difference & FEV1% was significant using Pearson formula and if FEV1% decreases the SVC- FVC difference increases proportionately (Negative correlation).

DISCUSSION

The purpose of the study is to correlate the difference between slow vital capacity and forced vital capacity with the severity of the COPD patients. The Spiro metric parameters such as Slow vital capacity and Forced vital capacity difference (SVC- FVC) and FEV1%. were compared in the control and patient groups. The FVC is lower than the SVC both in normal individuals and in obstructive patients. According to Eduardo González Constán et al, the difference between the SVC and the FVC increases with the degree of obstruction and SVC – FVC difference was positively correlated with the hyperinflation in COPD patients [6].

Current study shows that the SVC – FVC difference progressively increases with severity of COPD (p = 0.001, highly significant). These results can be explained pathophysiologically. In FVC procedure the airflow during forced exhalation is the result of the balance between elastic recoil of the lungs promoting flow and the resistance of the airways limiting flow [2]. In COPD, emphysema decreases the elastic recoil property and chronic bronchitis increases the airway resistance. With the net result first the air flow will decreases and then by air trapping, SVC - FVC difference increases. When the severity of COPD increases, the above mentioned parameters are also very much changed proportionately. Usually the FEV1% is used to grade the severity of COPD [8].

Current study suggests the SVC – FVC differences can also be a predictor for the severity of COPD. When FEV1% is used as a marker for reading the severity of COPD the predicted value is used for the derivation. However when the SVC-FVC is used, only the actual values of the subject

are taken into account. These values need to be standardized to decide the cut off value to grade the severity for practical applications.

CONCLUSION

From the results, it is cleared that slow vital capacity and forced vital capacity difference is well correlated with the severity of the COPD. Hence slow vital capacity and forced vital capacity difference can be used as the predictor of severity of COPD.

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Cardiovascular Autonomic Responses to Exercise in Normotensive Healthy Adults with Parental History of Hypertension

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ABSTRACT

Background: Hypertension(HTN) is a major public health problem in India. The diagnosis of hypertension is made when the average of 2 or more diastolic blood pressure(BP) measurements on at least 2 subsequent visits is consistently 140mm Hg. Positive family history of hypertension is one of the risk factors for being hypertensive in future life for their children. It is a major cardiovascular risk factor and contributes significantly to cardiovascular mortality. Hypertension is reported to be associated with sympathetic nervous system overactivity. Normotensive subjects with parental history of hypertension have greater sympathetic activity and early parasympathetic attenuation. Those with parental history of hypertension also show a high blood pressure response known as exaggerated response, to exercise testing. This detects cardiovascular autonomic changes in younger age groups and helps us to identify those prone to hypertension later in life though the subjects be normotensive initially. It helps to delay or prevent the onset of hypertension.

Aims and Objectives: 1.To compare variation in blood pressure at rest and post-exercise between normotensives with parental history of hypertension and normotensives without parental history of hypertension.

2. To compare heart rate variability at rest and post-exercise between normotensive with parental history of hypertension and normotensives without parental history of hypertension.

3. To evaluate whether these changes have predisposition to hypertension.

Materials and Method: The present study was performed in Electrophysiology laboratory, Upgraded Department of Physiology, Osmania Medical College.40 subjects with parental history of HTN as study group, 40 subjects without parental history of HTN as control group were selected between the age group 18-30years.BP was measured using ambulatory BP monitor and Heart rate variability(HRV) was analyzed by low frequency/high frequency ratio(LF/HF ratio) using software LABCHART version 8 provided by AD INSTRUMENTS. Both the parameters were recorded at rest and after subjecting to exercise on treadmill for 3minutes, after achieving desirable HR of moderate exercise (100-125 beats/minute).

Results: Paired t-test has been used to find significance between subjects with parental history of hypertension and without parental history of hypertension. One-way ANOVA has been used to find out the significant p values between the study and control group. There was no significant difference between age(p=0.7) and BMI(p=0.71) between two groups. While the mean basal systolic BP was significantly higher in the study group than in the control group, there was no significant difference in the basal diastolic BP in the two groups. Post-exercise recovery systolic BP was significantly higher in the study group than control group. There was no significant difference in post-exercise recovery diastolic BP between the two groups. Basal LF/HF ratio was also higher in the study group than control group.

Conclusion: A difference in basal systolic blood pressure and basal LF/HF ratio, found in offspring of hypertensive parents may be an early marker of cardiovascular change predisposing to HTN. Regular monitoring of autonomic activity may prove to be a useful tool in predicting the future hypertension.

Keywords: Hypertension(HTN), Parental history of hypertension, Blood pressure(BP),Heart rate variability(HRV), Sympathetic nervous system(SNS), Parasympathetic nervous system(PNS).

INTRODUCTION

Hypertension(HTN) is a global problem. Positive family history of hypertension is one of the risk factors for being hypertensive in future life for their children[1]. High blood pressure(BP) is a major public health problem in India[2-5]. It is a major cardiovascular risk factor[6-8] and contributes significantly to cardiovascular mortality[2]. In India, cardiovascular diseases(CVDs) are estimated to be responsible for 1.5 million deaths annually[9]. CVD will be the largest cause of mortality and morbidity in India[10]. HTN is a major risk factor for CVDs, including stroke and myocardial infarction and its burden is increasing disproportionately in developing countries as they undergo demographic transition[2,5,11,12]. Hypertension is reported to be associated with sympathetic nervous system overactivity[13,14]. Normotensive subjects with family history of hypertension(HTN) have greater sympathetic activity and also early parasympathetic attenuation[15-17].

The autonomic nervous system(ANS) is the part of the nervous system that is responsible for homeostasis. The ANS has two major and anatomically distinct divisions:the sympathetic and parasympathetic nervous systems[18]. The nervous system controls the circulation almost entirely through the ANS. The most important part of the ANS for regulating the circulation is the sympathetic nervous system(SNS). The parasympathetic nervous system(PNS), however, contributes importantly to regulation of heart function[19].

MATERIALS & METHOD

• **Subjects:** A total of 80 subjects who were normotensive healthy individuals studying in Osmania Medical College,Hyderabad were selected.

The total 80 subjects were divided into 2 groups:

1.Study group – 40 Normotensives with parental history of hypertension

2.Control group – 40 Normotensives without parental history of hypertension

• **Age group :** 18-30 years.

• **Sex distribution:** All the 80 subjects were males.

• **Inclusion criteria :**

1.Non-smokers

2.Normal range of Body mass index(BMI) (18.5-24.9kg/)

3.Normotensive(<140/90mmHg)

• **Exclusion criteria:**

1.Any acute illness

2.H/o diabetes mellitus

3.H/o HTN or any Anti-hypertensive medication

4.Physical disability like arthritis of the knee,which may impair walking on Treadmill.

• **Place of study :** The present study was conducted in Electrophysiology laboratory, Upgraded Department of Physiology, Osmania Medical College,Hyderabad.

• **History :** A full and detailed history of hypertensive parents was taken, regarding dosage, duration and type of antihypertensive therapy.

• **Blood pressure** and **HRV** was recorded in both the groups after obtaining informed consent from all participants after approval from Ethical Committee. Study was conducted in the morning between 9 AM to 11 AM after light breakfast.

BLOOD PRESSURE RECORDING:

• **Equipment :** ambulatory blood pressure monitor was used.

RECORDING PROTOCOL

The subjects were familiarized with the testing equipment and the procedure was explained. Blood pressure was recorded at rest (baseline recording) in supine and after exercise (post-exercise).The study was conducted after rest of 30 minutes. Resting period recording was done in quiet environment. 3 recordings were taken after rest of 30 minutes.Then the subjects were asked to stand on treadmill and start walking from 0.6 Kmph which was increased gradually to 3.2 Kmph.The subject was asked to walk till the target heart rate for moderate exercise i.e 100-125 bpm was achieved according to WHO (1978)

classification depending upon heart rate and oxygen consumption.The subject was instructed to walk for the next 3 minutes and then he was instructed to stop. BP was recorded at the 1st minute of recovery period.

HRV RECORDING

• **Equipment :** HRV was recorded using POWER LAB on LAB CHART version 8 provided by AD INSTRUMENTS, AUSTRALIA.

• **Basic technology:** Powerlab systems are manufactured under the ISO 9001:2000 certified quality management system.PowerLab systems meet the European EMC directive,which is equivalent to the FCC class B standard in the United states.All bipotential signal conditioners are approved to the IEC 60601-1 patient safety standard, making them safe for use with human subjects.Bioelectrical potential signals (ECG) can be recorded using bio Amp cable,a Tronomed D-1540 cable.Gain ranges of ±20 µV to 50 mV with a variety of high and low pass filters.

• **Recording protocol:**

The procedure was explained to the subject. Skin was prepared for the application of electrodes.

Resting period recording was done in supine, in quiet environment with minimal noise and body movement . Negative electrode was placed over right wrist. Positive electrode was placed over left wrist and a ground was placed above right ankle. These electrodes were connected to channel 3 of bio-amplifier cable and lead I ECG was recorded.ECG was again recorded after subjecting to treadmill exercise as mentioned in BP recording. A high quality HRV recording was taken under standardized condition to minimize artifacts.The HRV signal was first analogally recorded and then digitally converted and analyzed in the frequency domain.HRV signals were conveyed through A/D converter to PC and were analyzed.

FINDINGS

Mean ± SDs were used to describe normally distributed data.

Paired t-test has been used to find significance between subjects with parental history of hypertension and without parental history of hypertension.

One-way ANOVA has been used to find out the significant p values between the study and control group.

Table (1): Anova for basal and post-exercise systolic BP,diastolic BP and LF/HF ratio for control and study group.

Before	Mean		Std.Dev.	After	Mean		Std.Dev.	Before-After	Paired t-test	Probability	
BaseLine SYstolic BP	100.650	±	9.275	Post-Ex SYstolic BP	109.000	±	9.058	-8.350	16.676	0.000	***
BaseLine Diastolic BP	77.750	±	3.901	Post-Ex Diastolic BP	80.250	±	2.133	-2.500	5.219	0.000	***
BaseLine LF/HF	0.901	±	0.020	Post_ex LF/HF	5.075	±	0.235	-4.174	121.327	0.000	***

There was no significant difference between age (p=0.7) and BMI (P=0.71) between two groups.

All the physical characteristics of subjects of control as well as study group were statistically matched (p=0.05)

The mean basal systolic BP was significantly higher in the study group (109.6±7.8mmHg) than in the control group (100.6±9.2).

There was no significant difference in the basal diastolic BP in the two group (p<0.001)

Post-exercise recovery systolic BP was significantly higher in the study group (127.2±3.4mmHg) than control group (109±9.0mmHg).p<0.001 showing high significance.

There was no significant difference in post-exercise recovery diastolic BP between the two groups.

Basal LF/HF ratio was also higher in the study group (5.0 ± 0.2) than control group (0.9 ± 0.02).p <0.001 showing high significance.

There is no significant change in LF/HF ratio during recovery between the two groups(p<0.001)

CONCLUSION

There is clear evidence that basal systolic blood pressure and LF/HF ratio is higher in normotensive young men with parental history of hypertension. Studies have shown that those with a parental history of hypertension show a higher resting diastolic blood pressure.In the present study, there was no significant difference in basal diastolic blood pressure in both the groups. Similar results were observed by Soumya et al. Basal systolic blood pressure was significantly higher in the study group than in the control group,there was no significant difference in the basal diastolic blood pressure,heart rate in the two groups.This may be an early marker of cardiovascular autonomic change in subjects, with predisposition to hypertension.This study concludes that sympathetic nervous system hyperactivity develops in children of hypertensive parents with decreased parasympathetic activity. The systolic blood pressure during recovery was significantly higher at the first minute of post-exercise.The low frequency(LF) component is considered by some as a marker of sympathetic modulation and by others as a parameter that includes both sympathetic and parasympathetic influences. Studies have shown that normotensives with a family history of hypertension exhibit sympathovagal balance with decreased parasympathetic activity at the cardiac level.In accordance with these studies,LF/HF ratio was significantly higher in the study group than control group. LF/HF ratio is considered by some to mirror sympathovagal balance. The ratio of sympathetic to vagal activity was higher in the study group than the control group.

In the study group, there is no significant change in LF/HF ratio during recovery. HF represents the parasympathetic component.This

detects cardiovascular autonomic changes in younger age groups and helps us to identify those prone to hypertension later in life though the subjects of study group may be normotensive initially.Regular monitoring of autonomic activity may prove to be a useful tool in predicting the future hypertension.Moreover, physicians could start interventions in the form of exercise, diet and avoiding smoking to delay or prevent the onset of hypertension.

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Auditory Transmission in Iron Deficiency Anaemia

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ABSTRACT

Introduction: Iron deficiency anaemia is a worldwide health problem and is the most common nutritional deficiency. Impulse transmission in the auditory pathway might be affected by iron deficiency. Studies in this field are limited to children. Therefore to analyze whether iron deficiency (ID) in adults can also affect auditory transmission, this study was conducted to determine the effect of ID on sensory transmission in the auditory pathway.

Method: 36 female subjects from low socioeconomic group were selected. All were aged between 20-35.Haematological parameters like Hb, MCV, MCHC, Peripheral smear study and serum ferritin were measured. Brain stem auditory evoked potential (BAEP) were performed by brief acoustic monaural click stimuli.

Results: Haematological parameters & ferritin levels were significantly lower in anaemic group with a p value of < 0.0001.Wave V and I-V inter peak latency (IPL) were significantly prolonged with a p value of < 0.01.

Conclusion: In the present study auditory transmission was significantly prolonged in ID adult females & it reflects that a relation exists between ID anaemia and BAEP recordings. Further study can also be carried out in ID of different age group after treatment with fortified food.

Keywords: Iron deficiency anaemia, Serum ferritin, BAEP-Absolute and interpeak latency.

INTRODUCTION

Iron deficiency(ID) is one of the most important nutritional deficiencies in the world[1].It plays an important role in central nervous system functions such as myelination of spinal cord and white matter of cerebellar folds,synaptogenesis,synaptic plasticity, co-factor for number of enzymes involved in neurotransmitter synthesis including tryptophan hydroxylase and tyrosine hydroxylas [2,3,4] .Impulse transmission in the auditory pathway might be affected by iron deficiency[5]. Studies in this field are limited to children. Therefore to analyze whether ID in adults can also affect auditory transmission; this study was conducted to determine the effect of ID on sensory transmission in the auditory pathway.

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Evoked potentials are the important non-invasive diagnostic tool used in the assessment of conduction of sensory impulses in the nervous system[6].Auditory evoked potentials (AEPs) have been classified into short latency components, with latencies of under 10msec in adults; long latency AEPs,with latencies exceeding 50msec; and middle latency AEPs, with intermediate latencies. Short latency AEPs are commonly called Brain stem auditory evoked potentials(BAEPs).other synonyms include auditory brain stem response, brain stem audiometry,brain stem evoked response auditory(BERA) and far field electro cohleography[6].

Sohmer and Feinmesser (1967) were the first to publish auditory brainstem response recorded with surface electrodes in humans [7].In 1971, Jewett and Williston described the interpretations of waves arriving from the brainstem[8].BAEPs are potentials recorded from the ear and vertex in response to brief auditory click stimuli to assess the conduction

through the auditory pathway up to the midbrain. It comprises of 5 or more waves and 3 interpeak latencies (IPL) within 10 msec of the stimulus [9].The absolute latency of wave V and I-V IPL is particularly important because it represents the central conduction time along the auditory pathway[9,10]. Therefore in the present study ,wave V &I-V IPL were analyzed.

MATERIALS & METHOD

36 female subjects from low socioeconomic group were selected. All were aged between 20-35.The study was done at physiology research laboratory ,Thanjavur medical college ,from April 2014 to July2015 as a case control study.

A detailed history and thorough clinical and ENT examination was carried out to rule out any other medical problems besides anaemia. subjects with a history of acute haemorrhage ,those during menstrual period,malignancies, those on chemotherapy, radiotherapy and immunosuppresents,hearing impairement,history of alcoholism, history of ENT surgery, neurological disorders,seizures,psychiatric illness,vertigo,subjects who had past history of predisposing risk factors for abnormal hearing like meningitis, enteric fever ,severe jaundice, diabetes were excluded. Informed written consent was obtained from all the participants and experimental protocol was approved by the college ethical committee.

Haematological parameters like Hb, MCV, MCHC, and Peripheral smear study and serum ferritin were done to evaluate the iron deficient anaemic status of the subjects. Serum ferritin was done by fully automated bidirectionally interfaced chemi luminescent immune assay (CLIA) method. On the basis of their Hb content they were divided into control group (n=18, Hb ≥12gm %) and an anaemic group (n=18, Hb<12gm %).

BAEPs were recorded by using 4-channel Digital Polygraph, Digital colour monitor- 17j' model no: IT-173SB

BAEP-experimental design and recording:

Electrode placement and recording parameters used was standardised as recommended by the International federation of clinical neurophysiology committee using 10-20 international system [9].

Electrode placement:

Channel -1 is placed at Ai-C_Z (ipsilateral ear)

Channel-2 is placed at Ac-C_Z (contra lateral ear)

Ground electrode is placed at Fz

The subject was instructed to avoid hair spray or oil after the last hair wash.

Instrument setting: filter low cut 100 Hz,high cut 10KHz,sweep 5msec,sensitivity 10μv,pulse 11/sec,pulse width 0.1msec,notch-on,100 averages were recorded using click sound as stimulus.Head phones are placed on the ears for the delivery of the auditory stimulus at intensity of sound 30db.computerized averaging and superimposing of recording were done. Monaural stimulus was used and contra lateral ear was masked. Absolute latencies of waves I,II,III,IV&V and interpeak latencies(IPLs)between I-V,I-III,&III-V were recorded during the first 10ms after giving the click stimulus for each ear separately.

STATISTICAL ANALYSIS

Haematological parameters, serum ferritin, BAEP waveV latency & I-V IPL were analyzed by unpaired't' test. P< 0.01 was considered significant for statistical evaluation.Graph pad statistical software was used for data analysis.

RESULTS

The mean age for the control &anaemic group was 25.61, 25.17 respectively. There was no significant difference in age between control and anaemia. Haematological parameters &ferritin were significantly lower in anaemia than control with a p value of < 0.0001. (Table1).BAEP waveV latency &I-V IPL were significantly prolonged in ID anaemia with p< 0.01.(Table2). Peripheral smear study of anaemia showed microcytes with central pallor greater than 50% of diameter(hypochromic) (Fig 1).In control group cells of normal size &Hb content were seen.(Fig2)

Table 1-Age, Hematological parameters and serum ferritin of control and Anaemia

Parameters	Mean±SD Control (n=18)	Mean±SD Anaemia(n=18)	P
Age(y)	25.61±4.83	25.17±4.51	0.7772
Hb(g/dL)	13.567±1.048	8.611±1.373	<0.0001
MCV(fL)	92.6833±2.4860	73.6189±7.9972	<0.0001
MCHC (%)	33.489±2.042	25.794±3.181	<0.0001
Serum ferritin (ng/ml)	82.278±46.841	8.394±6.724	<0.0001

Table2-BAEP of control and anaemia

Parameters	Mean±SD Control	Mean±SD Anaemia	P
V	5.70556±0.20001	6.06083±0.42467	0.0029
IPL-I-V	4.04944±0.26693	4.53361±0.56616	0.0024
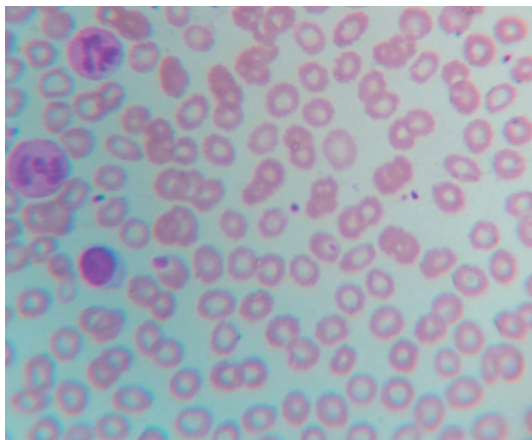
Fig 1: ID anaemia-Blood smear shows microcytes &hypochromic.
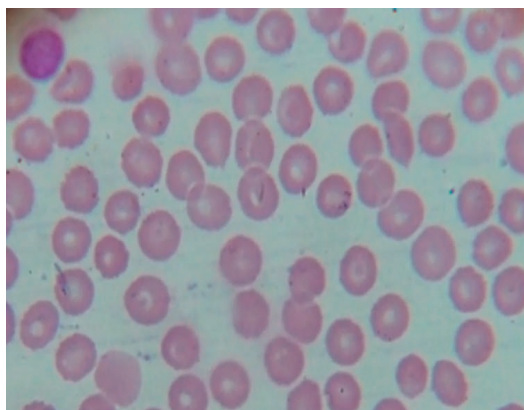
Fig 2: Cells of normal size & Hb content

DISCUSSION

Iron is an essential nutrient as well as a potential toxicant to cells. It requires proper regulatory mechanism to meet the demands of cells as well as prevent excess accumulation [11,12] .Evidences suggest that neurodegeneration occurs with dysregulated central nervous system iron homeostasis [12] . The present study showed longer latency of wave V &I-V IPLand it reflects that a relation exists between ID anaemia and BAEP in adult females.

AlgarinC et al studied the transmission in the auditory pathway in infants with ID, and reported that absolute latencies of all BAEP waves and IPL latencies except I-III were significantly longer [5] .SunAH et al studied the cochlear changes in growing rats, and electro physiological findings showed that an auditory threshold elevation of more than 15dB Was 31.85% in ID rats and cochlear hiostopathological changes revealed strial atrophy and reduction of spiral ganglion cells [13].

However KurekciAE et al found very little evidence of BAEPs among infants with ID. 3 groups of infants (control, ID, after treatment) were compared .The only positive finding was slight decrease in latency obtained at the end of the study when compared to prestudy values [14.] O.P Tandon et

al studied the BAEPS in ID children and found that the functional integrity of the auditory pathway is dependent upon the normal haematological profile of the individual [15]. In the present study we found that impulse transmission in the auditory pathway was prolonged in ID adult females.

CONCLUSION

In this study we sought to investigate the effect of ID on auditory transmission & found significant prolongation in auditory transmission in ID adult females. It revealed the importance of iron, haemoglobin and other haematological parameters for normal auditory transmission. Further study can also be carried out in ID of different age group after treatment with fortified food.

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A Cross-sectional Study of Perceived Stress and Sources of Stress among First Year Medical Students of Gauhati Medical College, Guwahati

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ABSTRACT

Stress may be defined as "any factor that threatens the health of an individual or has an adverse effect on the functioning of the body" (Oxford Medical Publications, 1985). Although stress is a normal component of our daily lives, prolonged stress can have negative effects on the mental and physical health of an individual. A student faces different types of stressful situations during his/her academic years. For some students, stress acts as a stimulating factor to help them perform better whereas some students find it difficult to cope up with the pressures of higher education. With this background, the present study was conducted to assess the levels of perceived stress, sources of stress and relation of perceived stress to academic performance among first-year MBBS students. A questionnaire-based cross-sectional study was conducted in the department of Physiology, Gauhati Medical College. 100 first year MBBS students (54 males and 46 females) were included. The mean Perceived Stress Score was 22.48 ± 5.60 (22.70 ±5.05 in females and 22.29±6.07 in males). There was no difference in PSS scores among males and females. The most common stressors were academic and environmental Identification of the sources of stress among students and taking appropriate measures to reduce the negative impact of stressors will promote a healthy academic environment.

Keywords: Stress, Students.

INTRODUCTION

There is a general perception that medical education is stressful and has a negative impact on students' academic performance as well as physical and mental well-being. In addition, stress may result in impairment of functioning in classroom, functioning in clinical practice, stress-induced disorders and deteriorating performance[1].

The term "Stress" is defined as any change in the environment that changes or threatens to change an optimal existing steady state [2]. A "Stressor" is defined as a stimulus or an event that provokes the stress response in an individual. Students, particularly in professional courses, are subjected to different kinds of stress, such as the pressure of doing well in academics with an obligation to succeed, peer pressure, an uncertain future and the difficulties of integrating into the system. In addition, students face social, emotional, physical and family problems which may affect their learning ability and academic performance[3,4].

High levels of stress may have a negative impact on the students' learning ability. Excessive stress may result in mental and physical problems and may diminish a student's sense of worth and might affect his/her academic achievement. A number of studies have focused on the stresses involved in medical training [5,6,7]. However very little is known about the impact of stress on academic performance of medical students. With the above background, the present study was carried out with the following objectives:

1. To assess the level of perceived stress among medical students

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2. To identify the sources of stress among the students

3. To determine the relation, if any, between perceived stress and academic performance

MATERIALS & METHOD

The present study is a cross-sectional survey using self-administered questionnaire. The study protocol was approved by the Institutional Ethics Committee, Gauhati Medical College and Hospital .100 first year MBBS students(46 females and 54 males) attending classes in the department of physiology were included in the study.

Study tool: The study questionnaire consists of 3 parts:

1. Part I: General Information

2. Part II: Perceived Stress Scale (PSS)

3. Part III: Student Stress Survey

The study procedure and the objectives of the study was explained to the students. It was explained to the students that their information will be kept confidential and will be used only for the purpose of the study. Participation in the study was be on voluntary basis. Written informed consent in the prescribed format was taken from the students opting to participate in the study

The academic performance of the students was assessed from the self-reported examination score of the first-semester ending examination.

The Perceived Stress Scale[8] is the most widely used psychological instrument for measuring the perception of stress. It was designed for use in community samples with at least a Junior High School education. PSS-10 scale was used to measure perceived stress in this study. PSS-10 consists of 10 questions, with responses varying from 0 to 4 for each item and ranging from never, almost never, sometimes, fairly often and very often respectively on the basis of occurrence during one month prior to survey. The possible range of scores varies from 0 to 40. The scores on the positive items (question no 4,5,7,8) are reversed (eg: 0=4,1=3,2=2 3=1,4=0) and then the scores of all the 10 items are summed to yield a single score. The cut – off value for the identification

of stressed cases was taken as 20, with subjects having PSS scores >20 being classified as stressed and those having PSS≤20 classified as non-stressed.

The Student Stress Survey is a 34-item questionnaire which includes four categories of stressors: Academic(10 stressors), Inter-personal(8 stressors), Intra-personal(8 stressors) and Environmental(8 stressors). In each case, the students were asked to indicate whether or not they have experienced the particular stressor during the current academic year. If yes, they were further asked to indicate how frequently they have experienced the particular stressor (rarely, sometimes, often, always) and scored as 1,2,3 and 4 respectively..

RESULTS

The overall mean perceived stress score of 100 students (54 males & 46 females) was found to be 22.48±5.60. Mean PSS score of the males was 22.29±6.07 and that of the females was 22.70±5.05. There is no statistically significant difference in the PSS scores between males and females. Taking 20 as the cut-off value, the subjects were classified as stressed (PSS score > 20) and non-stressed (PSS score≤ 20). More females were found to be stressed as compared to males. (Table 1)

Further, the level of satisfaction of the subjects' relationship with their parents and friends was assessed in the general questionnaire. Subjects were asked to indicate whether they were "very satisfied", "satisfied" or "not satisfied" with the relationships. It was seen that a greater percentage of non-stressed subjects were either satisfied or very satisfied with their relationships with parents and friends; whereas a greater percentage of stressed subjects were "not satisfied" with the relationships. (Table 2)

A greater percentage of non-stressed subjects had close friends. (Table 3)

The Pearson's correlation coefficient was calculated using MS Excel to determine the relation between perceived stress and academic performance. The average marks obtained by the students in the first semester ending examination (out of a total marks of 100) was 47.54±9.82. Mean marks of the female students (49.09±7.76) was higher than that obtained by the male students (46.22±11.19). A weak

negative correlation (r= - 0.26) was found between PSS score and marks obtained in the examination. Table 4 shows the mean±SD values of the marks obtained in examination by the stressed and non-stressed subjects. It is seen that the mean marks obtained in examination was higher among the non-stressed subjects compared to the stressed subjects, both in males and females.

The most frequently occurring sources of stress (stressors) reported by students as often/always were:

1. Performance in examination (63%)

2. Increased class workload (52%)

3. Lack of time for recreation (39%)

4. Competition with classmates (37%)

5. Quality of food in mess (36%)

6. Staying away from home (34%)

7. Performance in practicals (31%)

8. Dissatisfaction within class lectures (26%)

9. New responsibilities, loneliness (22%)

10. Frequency of examinations, Class attendance (21%)

Using a weighted score to assess the frequency of each stressor (rarely =1, sometimes=2, often=3, always = 4), it was seen that the top four stressors were same as the most frequent stressors. For the remaining stressors, there was a reshuffling of the order of occurrence but the sources of stress remained same. Class attendance and quality of food in mess were not among the top ten stressors when using the weighted score.

DISCUSSION

The young student population has always been vulnerable to stressful life conditions, especially in the pursuit of higher professional education in a highly competitive environment[7,9]. A large majority perceives itself as stressed in the college at one time or another, with little difference between males and females[10].

In the present study, 69.57% of females were found to be stressed as compared to 57.41% of males. Overall out of the 100 students, 63 % were found to be stressed (PSS>20)

A study from Agha Khan University, Pakistan has reported that more than 90% of students felt stressed at one time or the other during their course[10]. A similar study from India reported that 73% of the students had perceived stress at one time or the other during medical school [6]. Saipanish[7] reported that 61.4% of students in a Thai medical school had experienced some degree of stress as measured by the Thai Stress test.

Mostafa Amr et al[11] reported that a greater percentage of female students (23.8%) reported to have perceived stress compared to the males(17.1%). Difference was not statistically significant. Dahlin et al[12] suggested greater stress among female students. Other studies [13]have also suggested that female students have higher levels of stress than their male counterparts whereas some studies[6] do reveal gender differences.

The present study found that most of the stressors experienced commonly by the students were related to "academics". Previous studies have reported that academic/examinations are common sources of stress among medical students[6,7,10,14-19]. Even though tests / examinations are sources of stress, they are necessary in medical training as a tool for evaluation / assessment and to encourage students in learning. Some students perceive the tests /examinations as a burden while others consider them helpful for learning[20].

Environmental stressors such as lack of recreation, quality of food in the mess, staying away from home have also been found to be common sources in the present study.

Sreeramareddy et al[20] have also reported that psychosocial factors such as quality of food in mess, high parental expectations, lack of entertainment , feeling of loneliness and worrying about the future were important sources of stress for the students . These factors may be linked to staying in the hostel. Earlier studies have reported that psychosocial factors are important sources of stress for medical students[6,7,21].

Table 5 compares the most frequently occurring sources of stress of the present study with previous studies. Most of the frequently occurring stressors were related to academics.

M S Sherina et al[17] found that the prevalence of psychological stress among medical students was 41.9 %. When examining the stress of medical education, the General Professional Education of Physician (GPEP) Report , Association of American Medical College, suggested placing a greater emphasis on health programmes including stress management to help students cope with the stress of tertiary education[22]. Students who are prepared with more realistic expectations in their academic pursuits, coupled with stress management techniques and good social support would have an advantage in coping. The ultimate aim is to help medical students understand what is required of them and to adapt as quickly as possible[17].

Table 1: Comparative analysis of PSS scores according to gender of medical students

	STRESSED (PSS>20)	NON-STRESSED (PSS≤20)
FEMALES (46)	32 (69.57%)	14 (30.43%)
MALES (54)	31 (54.41%)	23 (42.59%)
TOTAL (100)	63 (63%)	37 (37%)

Table 2: Percentages of stressed and non-stressed students among males(m) and females(f) according to level of satisfaction with relationships

		STRESSED		NON-STRESSED	
		M	F	M	F
Relationship with friends	Satisfied/Very satisfied	84	84	91	92
	Not satisfied	16	16	9	7
Relationship with parents	Satisfied/Very satisfied	100	97	100	100
	Not satisfied	0	3	0	0

Table 3: Shows the percentage of stressed and non stressed students with respect to close friendship

Close Friends	Stressed		Non-stressed	
	Males	Females	Males	Females
Yes	77%	81%	82%	86%
No	23%	19%	18%	14%

Table 4: Shows the mean±sd values of the marks obtained in examination by the stressed and non-stressed students

	Marks Obtained In Examination (Mean±sd)	
	Males	Females
Stressed	44.87±10.68	48.57±7.34
Non-stressed	48.04±11.83	50.43±8.80

Table 5 – Comparative analysis of the five most commonly reported stressors by the medical students in the present study with other studies

	Present study	Mohsin Shah et al [5]	Ko SM et al [18]
1	Performance in examination	High parental expectations	Difficulty in keeping up with reading
2	Increased class workload	Frequency of examinations	Increased amount of academic work
3	Lack of time for recreation	Vastness of academic curriculum	Difficulty in tutorials
4	Competition with classmates	Sleeping difficulties	Little time for personal activity
5	Quality of food in the mess	Performance in periodic examination	Difficulties in lecture and peer competition

CONCLUSION

Academic stressors were found to be the most common sources of stress among students. Development of a more interactive relationship between teachers and students is required. Students should be taught different stress management techniques to improve their ability to cope with the demands of professional course. More time and facilities for sports and recreation needed to be provided to the students. A study from US has recommended that teaching stress management and self-care skills to medical students may be helpful[23]. Better facilities, particularly quality of food, are required for students staying in hostel. More over, students should be encouraged to discuss their problems with student counsellors and advisers. Promotion of a healthy academic environment with friendly interactions between teachers and students help the students to cope up with the stressful situations. Stress-management education and student counselling shall be helpful in early identification of the sources of stress and students experiencing stress during the course of medical education so that appropriate measures may be taken to prevent and/or decrease the occurrence of stress among the students.

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A Cross-sectional Study of Prevalence of Asymptomatic Coronary Artery Disease in Type2 Diabetic Patients of Kamrup District in Assam by Treadmill Test

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ABSTRACT

Background: India has become the Diabetic hub of the world. Ischaemic changes increases the morbidity and mortality of the diabetic patients. **Aims and objectives:** Coronary artery disease often silently kills Type2 diabetic patients. We therefore, aimed to study the prevalence of silent ischemic changes in clinically asymptomatic Type2 diabetic patients using Treadmill exercise test. **Method:** This is a cross-sectional study. The Treadmill test (TMT) was performed on fifty patients of Type2 diabetes mellitus, asymptomatic of coronary artery disease. Modified Bruce protocol was used to detect ischemic changes. **Results:** Out of the 50 patients, 33(66%) were male and 17(34%) were females. The results of Treadmill test showed that there is prevalence of Coronary artery disease in the study population. 26(52%) showed positive and 24(48%) showed negative TMT findings. We also compared the mean age and BMI between TMT positive and negative patients using t-test. It showed highly significant results(p<0.01). **Conclusion:** Ischemic changes of heart in Type2 diabetic patients can well be diagnosed using Treadmill test even if they remain clinically asymptomatic.

Keywords : type2 DM , treadmill test.

INTRODUCTION:

The term diabetes mellitus describes a metabolic disorder of multiple etiologies characterised by chronic hyperglycemia with disturbances of carbohydrate , protein and fat metabolism resulting from defects in insulin secretion or action. Diabetes can be classified into two major classes, type1 diabetes (T1DM) and type2 (T2DM)[1]. Diabetes mellitus is accepted as a worldwide epidemic with an estimated increasing prevalence from 2.8% in 2000 to 4.4% by 2030[2].

Diabetes and cardiovascular diseases are rapidly gaining pandemic proportions in the Southeast Asian subcontinent, and India is leading the race

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of numbers worldwide. At present every fifth diabetic in the world is an Indian. Coronary artery disease(CAD) is the leading cause of death in patients with type2 diabetes. It is asymptomatic because of silent myocardial ischemia[3]. The prevalence of CAD in our country varies from 23-65/1000 in males and 17-48/1000 in females making it a major cause of morbidity and mortality [4,5]. Type diabetes mellitus has got a distinct association with coronary artery disease and diabetic patients have 2-4 fold of higher risk of developing CAD than people without diabetes mellitus. However, progressive coronary artery disease remains asymptomatic in many cases of type 2 diabetes and this makes diagnosis difficult at proper time. Routine screening of asymptomatic coronary artery disease with ECG remains controversial, as majority of them present with normal ECG[5] . We present here a study showing relationship between type 2 DM and silent ischemia in patients of Kamrup district, Assam. Exercise electrocardiograph can identify the majority of patients likely to have

significant ischemia during their daily activities and remain the most important screening test for significant CAD. So, study by Tread mill Test (TMT) gives better result. Early detection of asymptomatic CAD in type2 diabetes mellitus may prevent cardiac catastrophies[2].

AIMS & OBJECTIVES

The present study aimed to study the prevalence of silent ischemic changes in clinically asymptomatic type2 diabetic patients using Treadmill exercise testing.

MATERIALS & METHOD

This is a cross-sectional study on patients of type2 diabetes mellitus who are clinically asymptomatic of coronary artery disease. The patients were taken from a private clinic in Guwahati, Assam . The study was approved by the Institutional Ethical committee of Gauhati Medical College and Hospital. Total of fifty patients of type2 Diabetes mellitus without clinical evidence of coronary artery disease attending the clinic were included in the study. Informed consent was taken from each patient before beginning the study. A detailed clinical history was taken and also, a detailed history was taken regarding duration of diabetes mellitus and hypertension. A thorough clinical examination of all the systems was done.

The Treadmill test which was performed to detect silent ischemic changes was according to modified Bruce protocol.

Exclusion criteria:

The patients who gave a positive past history of Ischemic heart disease, cerebrovascular disease, unstable angina, Renal disease, febrile illness or having abnormal ECG were excluded in the study.

Data analysis: All the data were analysed by using proper statistical methods.

The prevalence rate was expressed in percentage. Pie chart and tables are used to estimate the significance.

RESULTS

In this cross sectional study, we studied a total number of 50 type 2 diabetic patients without any evidence of Ischemic heart disease. Out of the cases, 33(66%) were male and 17(34%) were females patients. The patients were in the age group of 30 to 70 years. These demographic characteristics are shown in Table 1.

In our study population 28(56%) patients were suffering from diabetes mellitus for 4 to 6 years but only 5 patients gave history of diabetes mellitus for more than 9 years. The results are shown in Table 2.

The results of Treadmill test showed that there is prevalence of Coronary artery disease in the study population.

Among the total 50 patients, 26(52%) showed positive and 24(48%) showed negative TMT findings. Out of 26 positive cases, 16 were male and 10 were female patients. This is shown in Figure 1.

In our study, we also compared the mean age and BMI among TMT positive and TMT negative patients using t-test. It showed highly significant results (p<0.01) as shown in Table 3.

DISCUSSION

India leads to the world today with the largest number of diabetics in any given country. Diabetes Mellitus appears to confer a dramatic increase in the risk of silent ischemia with most studies suggesting a prevalence of 10-20%[13]. Coronary artery is a common cause of premature morbidity and mortality in diabetics. Evaluation of asymptomatic coronary artery disease in them is always a key issue .Type 2 DM is a Framingham risk factor for coronary arterial diseases (CAD)[14]. Early detection of coronary artery disease is therefore of paramount importance. Myocardial ischemia may be asymptomatic or silent in a patient with diabetes mellitus. Diagnosis of CAD in type 2 DM patients is largely based on the recommendations of American Diabetic Association (ADA), which advocates use of TMT or coronary arterial angiography for diagnosis of silent ischemia[15]. During the process we planned to study prevalence of silent myocardial ischemia which in recent years has emerged as an important risk factor for development of overt CAD and a predictor of future morbidity and mortality in these patients of the total ischemic episodes, only 20 – 30 % are symptomatic and remaining 60% – 70% are silent, popularly known

as silent myocardial ischemia. There are numerous pitfalls in using resting ECG in diagnosis of myocardial ischemia in patients with diabetes .In diabetics most common ECG abnormalities are nonspecific ST-T change with or without evidence of prior MI . ST-T wave abnormalities are seen in common general population with an overall prevelance of 8.5 % for men 7.7 % for women in the Framingham heart study .As the sensitivity and specificity of the resting ECG changes in patients with angina in diabetes is low, it cannot be relied to evaluate diabetes and angina with or without symptoms . Normal resting ECG does not exclude the presence of CAD .

Duration of diabetes is not a proven risk factor for silent ischemia according to ADA guidelines. However, there are several studies reporting positive correlation between the two[10,11]. Our study also supports the finding that duration is a strong predictor of IHD. There are studies recommending routine screening for IHD with TMT for patients who are suffering from DM for more than 10 yrs[10] .Gender as a risk factor to silent ischemia is significantly associated with TMT results , this in unison study done by Ghulam HB et al[12].

Numerous devices have been used to provide the dynamic exercise for exercise testing , including steps , escalators and ladder mills .Today , however the bicycle ergometer and treadmill are the most commonly used dynamic exercise device.

The motor driven treadmill was introduced for clinical use in the 1950s . It is the most commonly used dynamic testing modality since most patients are more familiar with walking .The use of treadmill presents a number of advantages because it is possible to adjust the speed and grade of walking to the ability of the subject . The workload can be increased by increasing the speed and or grade . The starting speed of 1.7 mph at a 10% grade recommended by Bruce and associates, resulting in an oxygen consumption of about 4 METs has been very satisfactorily.

Diabetics are prone to both overt and silent manifestations of atherosclerosis. There are numbers of studies reporting the prevalence of silent myocardial infarction in type2 diabetes mellitus, though the criteria for selection goals were different in each of them.

In our study, we found the prevalence of silent myocardial infarction in type2 diabetes mellitus patients of Kamrup district, Assam to be 52%. This result is comparable to that of other previous studies.

Jayasankar CA et al[3] showed the prevalence of silent MI in type 2 DM to be 31.37%.

Motoji N[5] found 31% of TMT positive patients among asymptomatic type 2 diabetes mellitus patients.

Gupta SB et al[6] found the prevalence of TMT positive cases in asymptomatic type 2 diabetes mellitus patients as 38.3% Sukhija R et al[7] found that silent myocardial ischaemia was seen to be 14 (46.7%) out of 30 diabetics by using treadmill test .

Mohan et al[8] treadmill testing in asymptomatic Type 2 Diabetes found that 51(42.5%) had evidence of silent ischaemia on treadmill testing. Achari V et al[9] in a clinical based study, reported a prevalence of 17.8% in diabetic patients.

Table 1: Age and sex wise distribution of the 50 cases

Age Group	Male	Female	Total
30-39 years	3	1	4
40-49 years	10	7	17
50-59 years	8	6	14
60-69 years	9	3	12
> 69 years	3	0	3
Total	33	17	50

Table 2: Duration of diabetes mellitus of the patients according to their sex

Sex of the patient					
Duration of Diabetes Mellitus (years)	Male	Female	Total	Degrees of freedom (d.f.)	χ^2-value
1-3 years	9	0	9		
4-6 years	24	4	28		
7-9 years	0	8	8	(4-1)x(2-1)=3	34.72**
> 9 years	0	5	5		
Total	33	17	50		

** Highly significant (p<0.01)
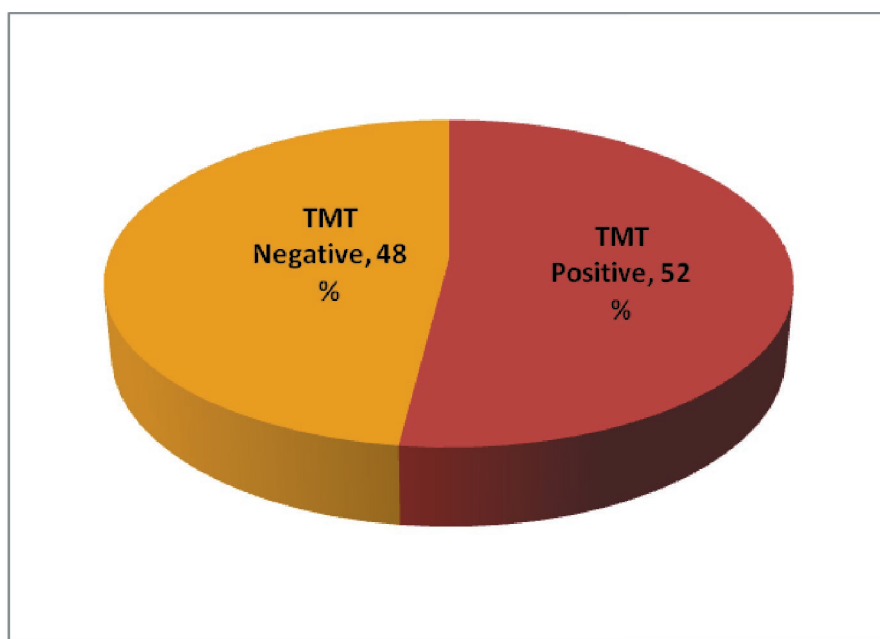
Figure 1: Pie diagram showing distribution of the patients according to TMT results

Table 3: Mean distribution of different variables among TMT positive& TMT negative cases & their 't'-values

Parameters	TMT Positive(n=26) Mean± SD	TMT Negative(n=24) Mean ± SD	Degrees of freedom (d.f.)	t-values	Significance
Age (in years)	55.58 ± 9.21	47.58 ± 8.86	48	3.122**	p<0.01
BMI (kg/m²)	27.49 ± 3.90	24.37 ± 3.16	48	3.096**	p<0.01
Duration of DM(in years)	5.96 ± 2.07	5.04 ± 2.07	48	1.569(N.S.)	p>0.05
SBP(mmHg)	126.38 ± 11.48	118.75 ± 12.27	48	2.273*	p<0.01
DBP(mmHg)	79.23 ± 2.72	75.79 ± 5.09	48	3.013**	p<0.01
HR(beats/min)	75.54 ± 9.70	79.17 ± 9.60	48	1.328(N.S.)	p>0.05

*Significant

**Highly Significant

N.S. Not Significant

Source(s) of support in the form of grants, equipment, drugs or all of these, if any : Nil

CONCLUSION

In our study, we found the prevalence of silent myocardial infarction in type2 diabetes mellitus patients of Kamrup district, Assam to be 52%. As silent myocardial infarction may cause catastrophies to patients, much importance should be given to do treadmill test mandatory for all type 2 diabetic patients attending the physicians .

Ethical Clearance: Taken from Institutional Ethical Committee

Conflict of Interest: Nil

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Muscular Performance in Euglycemic off Springs of Diabetic Parents Using Mosso`s Ergograph

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ABSTRACT

Objectives : Muscular performance in euglycemic offsprings of Diabetic parents in terms of Work done and time to fatigue.

Background:-- Diabetes Mellites is one of the important endocrine disorders that is associated with vascular symptoms. Blood supply to contracting muscle is affected by vascular disorders. Genetic factors play a role in the occurrence of diabetes mellitus

Method: A Case –control study was done with 30 males euglycemic offspringes of diabetic parents with age group between 19-25. 30 male offspringes of nondiabetic parents, matched age and anthropometric data were recruited as controls.

Muscular performance was assessed in terms of Work done and time to fatigue, by Ergogram , recorded with Mosso's Ergograph.

Results: There was no significant change in work done expressed in Kg.m in study group and control group cycle, though there is slight decrease in study group. (2.46±1.09) comparing to control group. 2.48±0.94) There is no significant change in time to fatigue thoughexpressed in seconds there is slight decrases in study group (90.06±18.55) comparing to control group. (104.13±39.88)

Conclusion : Though there is slight changes in values, as these are not statistically significant. As the offspring of diabetic patient are prone for developing diabetes in future due to hereditary factors, these individuals have to be carefully managed by advising regular exercise and dietary management.

Keywords:- Diabetes mellitus, Muscular performance, Fatigue.

INTRODUCTION

Mosso's Ergograph is employed to assess the performance of hand and foreman muscle and also to study the phenomenon of fatigue and factors that affect the fatigue[1].

The degree, duration and type of work are the important factors that affect the performance and onset of fatigue. Mosso's Ergograph is used for isotonic type of exercise[1]. Though many factors like age, sex, height, physical build, training, motivation, frequency of contractions, weight to be lifted affect the performance, but blood supply to contracting muscle is an important factor that affect the muscular performance. Blood supply to contracting muscle is affected by vascular disorders.

Diabetes Mellites is one of the important endocrine disorders that is associated with vascular symptoms. The prevalence of both type 1 and type 2 Diabetes Mellites is increasing worldwide and it has risen dramatically over the past two decades. (2,3) It is a major cause of mortality[2]. Chronic complication

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of Diabetes mellitus causes peripheral arterial disease which leads to narrowing of lumen of artery and causes decreased blood flow to contracting muscles.

There are more studies done to assess the muscular performance in diabetes patients [4,5,6], but there no studies done in Euglycemic offsprings of Diabetic parents. So we have taken this study to assess the Muscular performance in euglycemic offsprings of Diabetic parents in terms of Work done expressed in Kg.m and time to fatigue in seconds with frequency 1 per every 2 seconds.

MATERIALS & METHOD

The Cross – Sectional and Case –control study was conducted in the the Department of Physiology, Navodaya Medical College, Raichur, after obtaining Ethical clearance certificate from the Institutional research ethical committee (Human), during the period May to September 2014. Thirty (30) Euglycemic Males offspringes in the age group 19 to 25 years, with parental history of diabetics were included in the study and Thirty (30) male medical students in the age group of 19-25 years without history of parental diabetics were taken as controls. History suggestive of neurological abnormalities, any limb deformities, history of systemic diseases like hypertension and diabetes mellitus, history suggestive of muscular weakness and history suggestive of vascular disorder were excluded from the study. Written infirmed consent was taken from each participant. All subjects and controls were matched for anthropometric parameters and examined for vital parameters, which were within normal range.

Muscular performance was assessed in terms of work done by an Ergogram , recorded with Mosso's Ergograph. And Metronome was used to produce sound with adjusted frequency of 1 per every 2 sec. Electrical kymograph was used to record Ergogram .

In Mosso's ergograph , there is an arrangement for fixing the fingers and forearm in the appropriate holders . A load of 2 kg was used. With the help of middle finger, the load was lifted and it was marked by the writing lever on the moving electrical kymograph. (Ergogram). The record was obtained, till the load can no longer be lifted. With Ergogram, Work done is calculated by the formula

Work Done = Force (load) **X** Distance And expressed in terms of Kg.m or Gm.cm

Time, till the load can no longer be lifted is taken as onset of fatigue and expressed in terms of Seconds.

Statistical analysis: The results were expressed in terms of Mean±SD. The test of significance used was student " t" test (unpaired t-test) and a "p' value less than 0.05 was considered statistically significant. The data was analyzed by using SPSS 17.0 version statistical software. Microsoft Word and Excel have been used to generate graphs, tables etc.

FINDINGS

A Cross – Sectional and Case- control study was undertaken in 30 Euglycemic Males offspringes in the age group 19 to 25 years, with parental history of diabetics and 30 male medical students in the age group of 19-25 years without history of parental diabetics. All the subjects have vital parameters within normal range. There is no statistically significant difference in age, height, weight and BMI of study and control group.

Table No –1. Work done and time to fatigue in study and control group.

Parameter	Study group [mean±SD]	Control group [mean±SD	't' value	'p' value	Significance
Work done (Kg.m)	2.46±1.09	2.48±0.94	0.083	>0.05	NS
Time to fatigue (seconds)	90.06±18.55	104.13±39.88	1.701	>0.05	NS

DISCUSSION

Diabetes is a group of chronic diseases characterized by hyperglycemia. Type 2 diabetes has been associated with muscle atrophy and weakness in different clinical and population-based samples, and diabetic neuropathy involving motor neurons has been suggested to be an important determinant of accelerated muscle atrophy and loss of muscle strength in patients with diabetes[8]. Peripheral arterial disease, a common long-term diabetes complication, has been related to reduced motor nerve conduction velocity (NCV) and muscle power and impaired lower-extremity performance in older persons[7].

As diabetes characterized by hyperglycemia, risk of developing diabetic neuropathy is proportional to both the magnitude and duration of hyperglycemia, and some individuals may possess genetic attributes that affect their predisposition to developing such complications[8], and the injurious effects of hyperglycemia are separated into macrovascular complications (coronary artery disease, peripheral arterial disease, and stroke) and microvascular complications (diabetic nephropathy, neuropathy, and retinopathy). The central pathological mechanism in macrovascular disease is the process of atherosclerosis, which leads to narrowing of arterial walls throughout the body[8].

Even Normoglycemic offspring of patients with type 2 diabetes mellitus have impaired vascular and metabolic function accompanied by an enhanced proinflammatory state that may contribute to their increased risk of diabetes and its vascular complications[9].

In our study, though the absolute value muscular performance in terms of work done and time to fatigue is slightly decreased in offspring of diabetic patients, but it is not statistically significant. Though the changes may be occurring, it may not be manifested in this age group. As the offspring of diabetic patient are prone for developing diabetes in future due to hereditary factors[10], these individuals have to be carefully managed by advising regular exercise and dietary management.

Muscle biopsies showed that mitochondrial density was reduced by **38%** in the offspring of diabetic parents, compared to similar children of non-diabetic parents[11]. Those genetically predisposed to type 2 diabetes may be able to avert this calamity by doing regular physical exercise. As the offspring of diabetic patient are prone for developing diabetes in future due to hereditary factors, these individuals have to be carefully managed by advising regular exercise and dietary management

CONCLUSION

The absolute value muscular performance in terms of work done and time to fatigue is slightly decreased in offspring of diabetic patients, but it is not statistically significant. Though the changes may be occurring, it may not be manifested in this age group.

Conflict of Interest—Nil

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A Study of Critical Flickering Fusion Frequency Rate in Media Players

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ABSTRACT

Aim: This study investigated the effect of video games on Critical flickering fusion frequency rate (CFFFR).

Background: CFFFR is the rate of successive light flashes from a stationary light source at which the sensation of flicker disappears and the light becomes steady. CFFFR with higher values suggested that greater perceptual accuracy. The eye and brain act together to perceive flickering light. The activities in the retina and brain are synchronized as a part of the visual process. If the modulation i.e. flicker frequency is high enough, the visual system will perceive flickering light as a continuous steady light. This CFFFR has been used in the studies on physiology of vision, Stress, drug research.

Results: In the present study CFFFR was measured in two age-matched groups of healthy volunteers whose ages ranged from 18 – 45 years with 75 subjects in each group. Test group consists of Media players who were played video games since their childhood. Control group consists of Non-Media players who did not know how to play the video games. The scope of the present study is to know the effect of video games on CFFFR. The results in our study showed that CFFFR threshold increases significantly in media players when compared to non – media players (p<0.001).This study also showed that CFFFR significantly decreases as the age increases and high CFFFR threshold were recorded in media players who played puzzle and brain games than the action adventure and sports games. The gender effect on CFFFR was not significant but higher CFFFR values were recorded for men than women.

Conclusion: This study proved that playing video games can develop cognitive skills, high level thinking skills, problem solving complex, concentration, logical thinking, imagination and creativity but on the other side teenagers who spend an ample amount of time playing games experience effects which are not so beneficial at all.

Keywords: Critical flickering fusion frequency rate, Media and Non-Media players, Visual processing.

INTRODUCTION

The Critical Flickering Fusion frequency (CFFF) test measures the rate at which successively presented light stimuli appear to be steady and continuous. This rate, expressed in Hz, is commonly referred to as the "threshold frequency". Because it provides a measure to distinguish discrete sensory events and also provides an index of central nervous system (CNS) activity or "cortical arousal". The CFF is widely used in the study of human behavior, physiology of vision since it can be administered quickly, easily and relatively non-invasive[7]. Various factors that influence CFFF performance includes time of day, sleep deprivation, shift-work, work with visual display terminals i.e. video games, acute

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effects of substances like caffeine, alcohol, prescribed medication. CFFF performance can also be influenced by age, intelligence and gender. Though many factors influence the CFFF performance, in our study we concentrated more on the effect of video games on CFFFR[8].

In the 19th century, if you asked a teenage boy that what they did in their free time, they'd probably talk about assisting their parents on the work. You ask the same question to a teen in the mid 90's, and you'll get an answer regarding baseball, cricket, chess, caroms etc. But now we are living in a new millennium, where 97% of children and teenagers would reply 'videogames' to that question[3]. Video games are the most popular and widespread form of entertainment at present. Many video game developing countries earn billions of dollars and constantly invest into research aimed to make virtual reality look like reality. Their games become more and more popular, and they attract a wide audience. The main target audiences of game developing companies are children and teenagers, who actively engaging in video games at such a young age can produce both beneficial and adverse effects[8].

With regards to the positive effects, children playing video games can develop cognitive skills, high level thinking skills, problem solving complex, concentration, logical thinking, imagination and creativity. Furthermore, it has been shown that computer simulation games can improve users' motor skills[10]. Though the Developers of video games claim that first-person shooters and real-time strategies put focus on reflexes, enhance concentration and muscle timing, in reality, teenagers who spend an ample amount of time playing games experience effects which are not so beneficial at all[10].

Negative effects includes that there is a possibility of the loss of sight and visual fatigue. Spending hours on the computer or in front of the TV and playing video games is one of the main causes of blurred vision within teenagers. It is also seen that neglecting healthy physical activities in favor of video gaming may become a risk factor for obesity. Mental health can also be affected by engaging in video games at an early age. This indicates addiction and out of mind behavior. It is a well-known fact that many gamers suffer from addiction, which is almost similar to narcomania or alcoholism. This out of mind behavior can be caused by violence in video games. Many research studies indicated that children and teenagers who play violent video games tend to be more aggressive[4].

With this knowledge, the present study was conducted with the following aims and objectives: 1) To assess the effects of video games on the Critical flickering fusion frequency rate in media players and compare the results with controls i.e. non-media players. 2) To assess the age and gender based alterations on CFFR. 3) To compare the CFFFR threshold values between Puzzle, brain games and action adventure sports games.

METHOD

This study was undertaken by me on behalf of Department of Physiology, Narayana Medical College. The approval Medical ethics committee of Narayana Medical College, Nellore was taken for this "Study of Critical Flickering Fusion Frequency Rate in Media Players". Subjects were selected from Physiotherapy students, Medical lab technology students, teaching and non-teaching staff of Narayana medical college, aged between 18 to 45 years, who volunteered to take part in the study. The procedure was explained and written consent was obtained from the subjects. All the subjects are healthy volunteers and divided them into two groups i.e. media players and non-media players based on questionnaire regarding age, sex, spending time with video games in a day, watching length between the eyes and the television screen, subjective symptoms of eye strain, changes of visual acuity and video game playing for various categories of games (action, fighting, strategy, fantasy, and sports games). All subjects had normal vision or corrected vision and none of them had colour blindness[6].

CFFFR was measured with a standard electronic module designed by Dr.K.N.Maruthy Professor in Physiology Department, Narayana Medical College, Nellore. In this module, the system presents a series of Red light stimuli at different frequencies adjusted from 12 – 120 Hz with the help of SweepGen software. This red light stimuli was surrounded by a white background. After a short practice phase, each participant was seated in front of this module i.e. 80 cms from the stimulus in a semi-dark room

with a single 40-w bulb fixed behind the participant. Once all the pre-requisites were done, the frequency of flicker was gradually increased from minimum threshold of 12 Hz till the participants reported that they perceived successively presented light stimuli to be "constant" or "fused" or "steady". Performance data was obtained automatically from SweepGen. Data corresponding to the output variable "last frequency presented" were analysed. This provides an indication of the "critical" frequency, i.e. the highest frequency at which participants are unable to perceive flickering.

SweepGen is a lightweight and portable application that turns a PC into an Audio Oscillator and Sweep Generator which can be used for testing audio or educational purposes. In conjunction with audio test instruments, you can make frequency response plots. SweepGen uses the sound card in your PC to produce sine waves that are mathematically correct almost to CD quality, indeed it's more likely that the quality of your PC sound card will be the limiting factor rather than the code in SweepGen[13].

RESULTS

The results of the above tests were compared between the media and non-media players. Values are expressed as mean ± SEM in the tables. The comparison of results was also done between two groups according to the age, gender and Type of games

Table-1, CFFFR threshold values are high in Media players when compared to Non-media players and these values are highly significantly (p<0.0001).

According to Table-2, CFFFR threshold values gradually decreases as the age increases.

Table-3 shows that CFFFR threshold values are slightly higher in males when compared to females and these values are statistically not significant (p value - 0.176126)

Table-4 shows CFFFR threshold values are more in media players playing puzzle and education games than Action adventure sport games. These values are statistically significant with a p value of 0.0052.

DISCUSSION

The Critical flicker fusion threshold is an interesting concept in the psychophysiology of vision. CFFF specified that the frequency at which an intermittent light stimulus appears to be completely steady[1]. Flicker fusion threshold is related to persistence of vision. It's an important phenomenon in daily routine surrounding us as many display and lighting technologies work by displaying very brief flashes of light several times a second. This includes the incandescent light bulb, fluorescent lights and cathode ray tubes (CRTs, the bulky glass tubes in old TVs). The critical fusion frequency depends on the luminance of the stimulus and its size. For a large high luminance stimulus, flicker fusion occurs at about 60 Hz[2].

The present study showed a statistically significant increase in critical flickering fusion frequency rate in media players when compared to non-media players. This increase in CFFF in media players indicates an increase in visual sensitivity. Some previous studies also showed some positive effects that the video game playing would shorten reaction time, develops motivation and enhance visual attention[5]. However, some negative effects were also reported. Negative effects include eye fatigue, mental stress etc. Furthermore, the interaction of video games in media players significantly increases the CFFF as shown in Table 1 and Figure 2. The effect of game type was significant in all the media players as shown in Table 4 which reveal that the change in CFF for playing the puzzle and educational games was almost higher than that of playing the action adventure and sports games. The intensive and exciting puzzle and educational games caused the subjects to allocate more mental resources into visual attention and thus increased visual sensitivity which in turn increases the CFFFR. It seems that the exposure to the more dynamically changing images, numbers and moving objects while playing the intensive puzzle and educational games induced a higher level of cognition, concentration and visual attention. The prolonged attention and fast reaction required in playing the intensive and exciting puzzle and educational games resulted in a higher CFFF values. Additional, playing action adventure and sports games also showed good CFFFR threshold values[2].

We have shown that CFFFR can be significantly elevated in media players. These changes in CFFF co-occur with improvements of motion-direction sensitivity, which results from plasticity in visual areas. In addition, this plasticity is long lasting and is retained for years. Several research studies indicated that magnocellular ganglion cells of visual system show phasic activity that correspond well to heterochromatic flicker fusion thresholds of humans. On the other hand, the LGN (lateral geniculate body, a major nuclei in visual pathway through which optic radiation passes to visual cortex) can respond to flicker at rates approaching 100 Hz indicate that the retina is not rate limiting for luminance flicker fusion[3]. The specialized cells in magnocellular brain areas are also responsible for activating specific apparent movements react to inputs of high temporal frequencies. In addition, occipital lobe processing was also required to detect relatively high-frequency flickering stimuli.

In media players perceptual learning is the key concept in the elevated CFFFR values. The underlying mechanism of the perceptual learning is the plasticity. Some studies showed that sensory plasticity occurs through a strenghtening-learning signal. This learning signal is likely mediated by neurotransmitters such as acetylcholine and catecholamines like norepinephrine, dopamine which are widely released from subcortical brain areas in a task-specific manner and have been implicated in neuronal plasticity[5]. In media players, these reinforcement learning signal results in plasticity of neurons that are active for longer periods.

In our study we also focused on age and gender based alterations on CFFFR. There is a significant difference in the CFFFR values between young and old age (Table 2). According to our study as the age advances CFFF threshold values gradually decreases. The decrease in CFFF in old age is probably due to the degeneration of the optic nerve and cerebrum. Table 3 reveals that CFFFR threshold values are slightly higher in males than females and this gender effect on CFFF was not statistically significant[11]. Our study also indicated that males prefer to play the more intensive challenging games, and hence the engagement and participation tend to be higher when playing the boxing game. Obviously, females prefer the competitive but less exhaust games, and hence they have a more concern and participation in playing the

tennis game. The findings in our study correlated with the study conducted by Aaron R. Seitz et al[1].

Table-1: Comparison of CFFFR threshold values in Media and Non-media players

Parameter	Media players (n=75)	Non – media players (n=75)	P value
CFFFR threshold values in Hz	48.71 ± 0.3432	42.10 ± 0.2617	< 0.0001***

Table-: 2 Comparison of CFFFR threshold values in different age groups

Age in Years	CFFFR threshold values in Hz
18 - 21 years	47.84
22 - 26 years	46.63
27 - 31 years	44.85
32 - 35 years	43.63
36 - 39 years	40.42
40 - 43 years	39.46
44 - 45 years	38.38

Table-:3 Comparison of CFFFR threshold values in Males and Females

Parameter	Males	Females	P value
CFFFR threshold values in Hz	38.8	37.2	0.176126 NS

Table-:4 Comparison of CFFFR threshold values in type of game

Parameter	Puzzle and Educational games	Action, Adventure and Sports games	P value
CFFFR threshold values in Hz	49.29 ± 0.1893	48.45 ± 0.2263	0.0052**

CONCLUSION

The primary contribution of this study is to gain more information regarding critical flicker fusion frequency (CFFF). CFFF is an easy quick and Non-invasive technique used as a general indicator of

cortical processing, visual persistence and perceptual learning. Some findings from this study are as follows:

1. CFFFR threshold values are high in Media players when compared to Non-media players and these values are highly significantly ($p < 0.0001$)

2. CFFFR threshold values are more in media players playing puzzle and education games than Action adventure sport games.

3. CFFFR threshold values gradually decreases as the age increases.

4. CFFFR threshold values are slightly higher in males when compared to females and these values are statistically not significant

Final conclusion - In media players, playing action video games improves acuity and contrast sensitivity, as well as enlarging the useful field of view, improving the number of moving objects that can be tracked simultaneously, and enhancing selective attention.

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Pre-donor Haemovigilance: Evaluation of Community Limiting Factors for Blood Donation to Frame Better Transfusion Policies to Increase Blood Availability

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ABSTRACT

Context: The healthcare delivery in surgical as well as medical departments of the hospital depends on the availability of appropriate blood units. These are indispensible for survival in majority of critical patients especially road traffic accidents, surgery and obstetrics departments. The safest blood comes from the voluntary blood donors. In some societies, preoccupied misconceptions or apprehensions drastically limit the blood donation behaviour and cause shortage of safe blood units in the blood banks of the hospitals. Understanding these perceptions in the catchment population may help in framing better transfusion policies for the targeted community. Our study evaluated the prevalence of the apprehensions of adverse events due to blood donation as the limiting factors modifying the blood donation attitude in rural population of Mewat, Haryana.

Method: A community based one-time cross-sectional questionnaire survey was conducted where 300 randomly selected participants above 18 years of age were taken. The questionnaire in Hindi and English were provided to the subjects to mark the pre-framed 15 choices along with a blank space which was left to write any other comments if there are any. The descriptive statistics and graphs were done with the help of Microsoft Excel 2010.

Results: The irreversible weakness of strength that would never be regained was perceived by 74% respondents. Whereas 19%, 13% and 6% reported irreversible deficit of blood, lack of knowledge or awareness and donation related pain due to prick respectively as limiting factors for the blood donation.

Discussion: The pre-occupied misconceptions are strong perceptions of adverse events such as an irreversible weakness for entire life, irreparable deficit of blood and fear of pain due to prick during blood donation in the target population. Thus education and community counselling through pre-donor haemovigilance is crucial to allay the fear and frame the transfusion policies in target populations.

Keywords: Pre-donor Haemovigilance, Adverse events, Transfusion policies, Voluntary blood donation

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CONTEXT

Blood transfusion is growing as a therapy for the management of patients not only presenting with accident injuries or surgical conditions but also with more routine needs such as Anemia, pregnancy

complications, dengue and blood disorders.[1-2]All the hospitals establish a blood bank to maintain an uninterrupted supply of blood units to the patients. The blood units for blood bank are collected by replacement donation, voluntary blood donation and rarely by professional donation.

The demand and supply mismatch is wider in developing countries than in developed nations.[1, 3]Some areas of India are especially prone for scarcity of blood due some inherent misconceptions, customs and taboos about blood donation in their population.[4] Mewat district of Haryana is one the most vulnerable area in this respect. A large number of mortalities in this region occur due to non-availability of blood in emergency as well as routine conditions. As per the 2011 government census report, it has rural area of approximately 1441.71 square kilometers with total population of around ten lakhs and ninety thousands out of which 90% are living in rural areas. There is only one more blood bank in this district apart from our institution. In the past one year only 430 voluntary blood units have been collected in our 450 bedded tertiary care teaching hospital rest has been obtained by arranging blood bank camps in other districts. The blood donation behavior of the target population is far less than the optimum turn out.

This study was conducted to evaluate apprehensions of target population to donate blood due their perception of adverse events related to donation (i.e., Pre-Donor Haemovigilance) which act as limiting factors in their blood donation behaviour. The purpose was to get the information for better communication to educate the donors regarding target population specific misconceptions of adverse events to provide the better healthcare.

METHOD

Selection and Description of participants

The participants were healthy volunteers from population of Mewat. A total 300 participants were enrolled in the study after taking oral consent. All the subjects were more than 18 years old and mentally sound. The participants included both male and female irrespective of their religion and community background. It was a one-time cross-sectional survey completed in three months.

Technical Information

A questionnaire was prepared by extensive research on the related literature. It was checked for the reliability by introducing it to the same respondent on two separate time points. All participants were provided with the survey questionnaire in Hindi and/or English. It carried 15 pre-framed options about the reasons that might be implicated for not donating blood and a blank space was provided for any other reason. The participants were asked to pick options which they thought may be the major reasons for their not donating blood. If their reasons were not included in the 15 pre-framed options the participant had option to write the exact reason in extra blank space provided. The proforma for questionnaire also carried other demographic and social details of participant like age, sex, religion, educational qualification, type of family (nuclear or joint) etc.

Statistical analysis

The results were analysed with the help of Excel 2010. Wherever possible the values have been represented as mean ± standard deviation.

RESULTS

Out of the 300 participants with mean age of 36.02±12.63), almost 92% were Muslims and prefer to live in Joint family. The 37% of the participants were illiterate and almost 87% were ≤ 12 standards educated. Table 1 shows the other demographic indicators of the participants. The study included participants of varied educational status (from completely illiterate to postgraduate). The majority (70%) of the participants lived in joint family and others in nuclear family.

The survey questionnaire contained 15 responses and a blank space to make any otherdesired comments by the respondents. The responses obtained in each category are shown in Table 2. The majority of the participants (74%) believed that irreversible weakness of strength resulting due to donation is the main hindering factor for blood donation. Second most common reason for not donating blood was apprehensions of irreparable volumetric deficit of blood in 19% of the target population.

There was no response in seven categories out of 16

total items in the questionnaire. Only nine categories were marked as the potential apprehensions for non-donation of the blood by the regional population (Figure 1).

DISCUSSION

The blood is thought to be a living force and was used as a medicine in ancient times of Egypt where it was used as life giving medicine for sick, old and other disorders.[1,5] Even today there are no substitutes of blood. It is indispensable in many conditions of emergency, elective surgeries and various infectious disorders. It saves millions of life throughout the globe. However the quantity as well as the quality of available blood is concerning factors for transfusion medicine especially in developing countries.[6]

Surely its availability in the nearby hospital proves lifesaving in road traffic accidents.[7] Its need is growing day by day in infectious conditions such as dengue haemorrhagic fever where platelet components are essential for survival in critical cases. Blood is also very important lifesaving therapy in deliveries with complications and in patients of anaemia especially in areas where prevalence of severe anaemia is very high in all age groups.[8] Although the growing blood transfusion practices saves lives in every aspect of healthcare delivery but there are some associated adverse events related to donors.[9-10] The safest blood comes from the voluntary or replacement donors and are fundamental to the growth of transfusion medicine speciality.[11]

However in general population many factors have been associated with the intentions to donate blood such as altruism, family values, peer influence, knowledge, social obligation, clear health communication and behavioural positive community perception.[12-17] The factors limiting the blood donation to such a low levels have not been studied appropriately. A lot of investment is being made to allay the social factors although our study has pointed out that the actual reasons are the apprehensions of adverse events.

We conducted this study in rural community around the tertiary care teaching hospital as the findings from the community are more representative of the general public. The study population was representative of the area with regard to the religion, residence and education. We observed that perception of adverse events is the major cause for limited blood donation in this region of Haryana. The most common perception (74%) of the target population was the irreversible weakness of strength after blood donation that cannot be regained throughout the life. The 19% of the participants believed that blood donation will result in irreversible volumetric deficit of blood. The outcome of this study was a paradigm shift from the assumption where level of education is considered the main factor for non-donation of blood in common parlance.

In addition to that 13% said that the lack of knowledge or awareness regarding blood donation may be a factor for not donating blood which delineates the need to define the content of awareness and types of education to save blood relatives. While six percent were of the opinion that fear of pain due to prick of the needle is the reason for not donating blood. Three per cent sample population did not see any reason to donate blood while two per cent of the participants are having misconception that something else is taken in the garb of blood and two per cent thought that more blood units are taken than what is required. The religious restrictions and chances of having infections during the donation constituted one per cent response in each category.

Although this district is distinct from rest of the Haryana in many aspects such as culture, religion, practices and beliefs but many areas of developing nations pose the same problems. The decreased number of blood units' donation position a great stress on healthcare delivery for the patients. Therefore the optimum numbers of the blood units were obtained through blood camps in other districts but the lack of blood donation is very concerning in this region where there are negligible non-governmental organisation, red-cross society, corporate profit making and governmental run blood banks support. The donor education regarding the prevalent misconceptions, adverse events related to blood donation is essential.[18]

Interestingly, the blood is considered as drug and blood banks need mandatory licensing from the Central Drug Standard Control Organisation. The detection, assessment, understanding and prevention of the adverse reactions and events

related to transfusion medicine are categorised as Haemovigilance [19-20.] It is a relatively recent science to enhance the transfusion safety.[21]As the intention and motivation to donate blood is essential to maintain the supply chain to the replenishment levels.[22]It encompasses the complete transfusion chain steps including pre-donation haemovigilance (PDH) aspects such as identification of donors and assessment of donors for safety of donation and mitigating their apprehension. Intermediate laboratory procedures such as processing, issuance, monitoring of prescription, pre-transfusion testing, samples transfer, component allocation, labelling and collection from storage determines the shelf-life and safety chain for blood units. The assessment of the recipient such as decision to transfuse, bedside administrative checks and post-transfusion adverse events monitoring are the final aspects of the whole process. Its main function is to provide a transfusion policy for the target areas for improvement in identifying trends associated with adverse reactions and events.

Thus our study was based on a newer concept proposed by our team as 'Pre-donor Haemovigilance' (Figure 2). Its assessment and mitigation can help motivate the voluntary and replacement donors in the target population. As even the replacement donors are difficult to find in these areas, there is a lack of replenishment of the blood bank stocks. There is a need to spread the awareness in the society that there are no adverse events due to blood donation. This is one of the duties of the doctors to clear misconceptions and spread awareness in the society along with the healing.

Limitations of the Study Our study had smaller sample size and was done only in the catchment areas of our tertiary care government teaching hospital. Although our sample was representative of the local religious and cultural population but still more parameters for uniformity can be utilised in further studies.

Recommendation: It is really hard for the healthcare teams to formulate policies conducive to the target population because of the wide gap in cultural, educational and regional aspects of Mewat district of Haryana. Still many social interventions may help increasing the blood donation culture. First is the intensive awareness and educational programs with the help of local non-governmental organisation to sensitise the general public for the voluntary and replacement donation using audio-visual aids. Secondly, there should be demonstrations of all the safety precautions to the general public during the blood camps. Thirdly, there should be arrangements of workshops for the local religious leaders regarding the utility of blood donation in the society. Fourthly school curriculum in Madrasas and nearby school should have materials to allay fears in the future generations. Fifth, there should be participation of doctors as a teacher in the blood camps more than as healers. Sixth there should be more advertisement for information, education and communication to motivate the target population. Seven, people should be provided with some non-monetary incentives on the donor cards such as assurance of free blood units, certificates and gifts relevant to the local needs.

Table 1: Demographic profile of participants in the survey

Variable	Values
Total No. of Participants	300
Male:	237
Female:	63
Age:	36.02±12.63
Education: Illiterate ≤5th Class ≤10th Class =12th Class Undergraduate Postgraduate	 111 36 81 33 33 06
Religion: Islam Hinduism	 243 57
Family type: Nuclear Family Joint Family	 90 210

Table 2: Responses in the survey questionnaire

S.No.	Response questions for hampering blood donation	Responses
1.	Haematoma	0
2.	Fever	0
3.	Allergic reaction	0
4.	Volumetric deficit of blood	57
5.	Impotency or Infertility	0
6.	Weakness of strength that would never be regained	222
7.	Donation related Infections	3
8.	Fear from pain of the prick	18
9.	Paresis or nerve injury in the arm	0
10.	Some complications in close known blood donor	0
11.	Something else is taken in the garb of blood donation	6
12.	Previous bad experience of blood donation	0
13.	Religious limitation	3
14.	Why would I give my blood	9
15.	Lack of knowledge or awareness	39
16.	Any other comment: More blood units are taken than are required	6
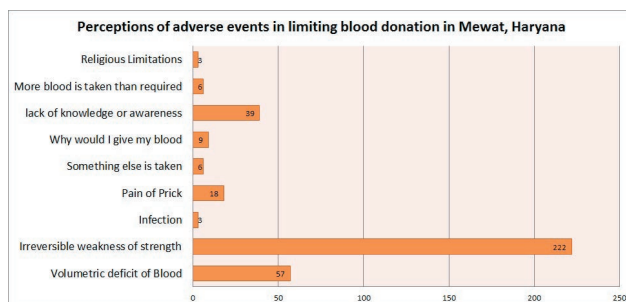
Figure: Types and frequency of adverse events as limiting factors for blood donation

CONCLUSIONS

The findings of our research determined the pre-occupied misconceptions as the fear of adverse events due to blood donation in the population of Mewat, Haryana. The blood donation culture as voluntary or replacement donor is very grim in this area. The PDHis imperative in such communities to allay the fear, motivate the general population and frame the transfusion policies.

Ethical Clearance: Not needed.

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Assessment of Pulmonary Function and Functional Capacity in Overweight Young Adults: Correlation with Visceral Fat

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ABSTRACT

Background, Aims and Objectives: Fat accumulation in thoracic and abdominal cavities changes respiratory function which may lead to reduced functional capacity.

In view of alarming rise in overweight and obesity globally and scanty data in the above mentioned deterioration, the present study is done to evaluate the pulmonary function, functional capacity and its association with visceral fat in overweight individuals.

Study Design: This is a cross sectional study in which pulmonary function, functional capacity are assessed in 40 healthy volunteers (controls) and 40 overweight individuals (study group), measured for the following: forced vital capacity (FVC), forced expiratory volume at 1 second (FEV1), and forced expiratory flow during the middle half of the FVC (FEF25-75) from the forced expiratory volume curve by the spirometry, and the body composition by the bioelectrical impedance method. Correlation and a multiple linear regression, between the body composition and pulmonary function, were used.

Results: The results of this study demonstrate significant difference in pulmonary function, functional capacity and negatively correlated with visceral fat in over weight individuals.

Conclusion: In overweight individuals, visceral fat is associated with reduced pulmonary function and functional capacity.

Keywords: Pulmonary Function Tests; Body mass index, Body Composition, visceral fat%, functional capacity.

INTRODUCTION

Overweight and obesity are due to excessive fat accumulation that may impair health which is because of an imbalance between calories consumed and expended. The global epidemic of overweight and obesity is the major public health problem in developed as well as developing world. Obesity has reached epidemic proportions in India in 21st century with morbid obesity affecting 5% of countries population[1]. According to National Family Health Survey data, 12.1% males and 16% females of Indian population are obese/overweight, and Andhra Pradesh with 17.6 % males, 22.7 % females[2]. Values of body weight adjusted for height referred to Body Mass Index BMI (kg/m^2), is used to determine obesity and overweight status. Fat accumulation in thoracic and abdominal cavities changes respiratory function[3] which may lead to reduced functional capacity and impaired myocardial efficiency. Reduced pulmonary function and its association with body fat distribution[4], BMI and waist measurement has been reported.

To the best of our knowledge, little *research has* been *performed* so far to assess the pulmonary function,

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functional capacity and its association with visceral fat in overweight individuals. In view of alarming rise in overweight and obesity globally and scanty data in the above mentioned deterioration, the present study is done to evaluate the pulmonary function, functional capacity and its association with visceral fat in overweight individuals, which would help to warn the over-weight subjects to decrease their weight particularly visceral fat by lifestyle modification and prevent from becoming obese which would worsen their lung function and functional capacity.

This study would also help in creating awareness among the population to take precautions right at an early stage.

Aims and Objectives:

To study the pulmonary function, functional capacity and its association with visceral fat in overweight individuals.

MATERIALS & METHOD

Study Design:- This is a cross sectional study in which pulmonary function, functional capacity are assessed in 40 healthy volunteers (controls) and 40 overweight individuals (study group) based on the following criteria.

Inclusion criteria:

Age: 18 – 30 years.

Gender: Male and female.

BMI $\geq$ 23 – 24.9 kg/m^2 (Study group/overweight)

BMI of 18.50 – 22.99 kg/m^2 (Control group)

Exclusion criteria:

Subjects with BMI < 18 and > 25-29.9 kg/m^2

Cardio-respiratory illnesses,

Chronic smokers, drug abusers,

Kyphosis, Scoliosis etc.

Parameters recorded:

1. Pulmonary function test: force vital capacity (FVC), forced expiratory volume in 1 second (FEV1), forced expiratory volume% (FVC/FEV1%), peak expiratory flow (PEF), forced expiratory flow during 25-75%of expiration (FEF25-35%)

2. Assessment Of Functional Capacity: 6 minute walk test

3. Estimation of BMI, WHR, Measurement of body fat distribution

Brief procedure: After getting clearance from the institute ethics committee, written informed consent was obtained from all the participants. All experiments were performed at Pulmonary testing laboratory in the Dept of Physiology, Narayana Medical College (NMC), Nellore.

Assessment of pulmonary function: Pulmonary functions were assessed by using computerized spirometer (Spirowin Version 2.0 of Genesis Medical systems pvt. Ltd) which gives ERS-93 predicted values at BTPS conditions. The subjects were allowed to sit quietly for 10 minutes to become mentally and physically relaxed prior to testing. Subjects were asked to inspire as much as possible and hold the sterile mouth piece in the mouth with the lips forming a tight seal around the mouth piece and expire rapidly and forcefully through the mouth piece. After preliminary trials, the best of three recordings was considered. The readings for Forced vital capacity (FVC), Forced expiratory volume in the first second (FEV1), Forced expiratory volume percent (FEV1 /FVC%), Peak expiratory flow (PEF), Forced expiratory flow 25-75% (FEF25-75%) noted.

Measurement of functional capacity: Functional capacity was measured by using 6 minutes walk test (6MWT). An internal hallway with the 100-feet distance marked by colored tape on the floor. The participants were informed that the purpose of the test was to see how far one can walk in six minutes, instructed to walk from one end to the other end of the hallway at their own pace, in order to cover as much distance as possible. A mechanical lap counter was used to count the number of laps completed, and an electronic timer with a buzzer that sounded when six- minutes test period was over.

Measurement of body fat distribution: Body fat distribution was measured by using body fat analyzer working under the principle of bioelectrical impedance analysis **(BIA)** method. The general

principle behind BIA: two or more conductors will be attached to a person's body and a small electric current is sent through the body. The resistance between the conductors will provide a measure of body fat between a pair of electrodes, since the resistance to electricity varies between adipose, muscular and skeletal tissue. Fat-free mass (muscle) is a good conductor as it contains a large amount of water and electrolytes, while fat is anhydrous and a poor conductor of electric current.

Anthropometric profile: Height measured by using a stadiometer in the upright position and weight on a weighing machine. BMI was calculated by weight (Kg) divided by the square of height in meter. The Waist Circumference was measured as the minimum Circumference between the costal margin and iliac crest, in horizontal plane, with the subject standing. Hip circumference measured as the maximum circumference in the horizontal plane, over the buttocks. The ratio of the former to the latter (Waist-Hip ratio) provides an index of proportion of intra-abdominal fat.

Statistical analysis: Statistical analysis was done by utilizing the Statistical Package for Social Sciences Version 16.0. Data expressed as mean ± Standard Deviation. The data examined for normality, 2 tailed paired t - test for normally distributed data, Wilcoxon signed rank test used for skewed data. Association between visceral fat and pulmonary function, functional capacity was assessed by using Pearson's correlation coefficient. The null hypothesis rejected at p<0.05.

RESULTS

General characteristics of the study group are given in Table 1. There is no statistical significance in age (p=0.464), height (p=0.243) and weight is significantly different between groups (p=0.000).

The results of between group differences in body composition variable are depicted in table 2, and the between group comparison of pulmonary function, functional capacity parameters are depicted in table 3. Results of pulmonary function tests are depicted as actual values and not corrected for age and height. One reason for this is that there are no significant differences in age and height between groups, and secondly, there are no standardized values of the

Indian population.

Table 1. Characteristics and between group comparison of the study participants.

Sl. no	Parameter	CG (n=40)	OG (n=40)	p value
1	Age(years)	21.10±0.87	21.26±1.16	0.464
2	Gender (m/f)	12/28	19/22	
3	Height(cms)	161.68±8.68	161.90±12.86	0.243
4	Weight(cms)	54.70±6.62	66.12±10.45	0.000

CG=Control group; OG=Overweight group;

Table 2. Between group comparison of body composition variables.

Sl. no	Parameter	CG (n=40)	OG (n=40)	p value
1	Waist(cms)	73.05±7.10	79.58±9.48	0.001
2	Hip(cms)	91.06±5.60	97.63±6.25	0.000
3	WHR	0.79±0.06	0.81±0.07	0.398
4	Body fat (%)	27.53±7.02	27.59±5.11	0.965
5	Visceral fat (%)	4.20±1.42	7.04±1.89	0.000

WHR-Waist hip ratio; CG=Control group; OG=Overweight group

Table 3. Between group comparison of pulmonary function, functional capacity parameters.

Sl. no	Parameter	CG (n=40)	OG (n=40)	p value
1	FVC(liters)	4.24 ± 0.77	2.84±0.56	0.000
2	FEV1(liters)	3.39±0.54	1.56±0.49	0.003
3	FEV1/FVC%	79.95±0.25	54.92±0.25	0.000
4	FEF 25-75 (liters/ seconds)	3.45±0.25	1.13±0.37	0.000
5	PEF(liters/ seconds)	5.09±1.47	4.91±1.27	0.158
6	FC(meters)	582.05±55.73	495.36±62.80	0.004

CG=Control group; OG=Overweight group

FVC-Forced Vital Capacity

FEV1-Forced Expiratory Volume in 1 Second

FEV1/FVC- Forced Expiratory Volume in 1 Second/Forced Vital Capacity

FEF25-75%-Forced Expiratory Flow during 25-75% of Expiration

PEF-Peak Expiratory Flow,

FC-Functional Capacity

Table 4. Association of visceral fat with pulmonary function, functional capacity &RPP.

S.NO	PARAMETERS	Visceral fat (%)	
		OG (n=40)	
		r-value	p-value
1	BMI(kg/m²)	0.653	0.000
2	FC(meters)	-0.423	0.001
3	FVC(liters)	0.028	0.860
4	FEV1(liters)	-0.061	0.707
5	FEV1/FVC%	-0.217	0.173
6	FEF25-75 (liters/ seconds)	-0.627	0.000
7	PEF (liters/seconds)	-0.158	0.324

OG=Overweight group

BMI-Body Mass Index

RPP-Rate Pressure Product

FC-Functional Capacity

FVC-Forced   Vital   Capacity
FEV1-Forced Expiratory Volume in 1 Second

FEV1/FVC-Forced Expiratory Volume in 1 Second/Forced Vital Capacity

FEF25-75%-Forced Expiratory Flow during 25-75% of Expiration

PEF-Peak Expiratory Flow

DISCUSSION

In this study we assessed the pulmonary function, functional capacity in over weight individuals and its association with visceral fat. The results of this study demonstrate significant difference in pulmonary function, functional capacity and negatively correlated with visceral fat in over weight individuals.

In this study, pulmonary function was assessed by FVC, FEV1, FEV1/FVC, FEF 25-75%, PEF. FVC is the total volume expired forcefully after a maximal Inspiration, it differs very little from vital capacity in normal subjects, but it is proportionately more reduced when there is airway obstruction with air trapping. FEV1 is the forced expiratory volume in the first second. This is an index of air flow rate. In normal conditions 80-85% of the forced vital capacity is expired in the first second. It is one of the most useful tests to detect the generalized airway obstruction. The FEV1/FVC ratio, also called Tiffeneau-Pinelli index, is a calculated ratio used in the diagnosis of obstructive and restrictive lung disease. It represents the proportion of a person's vital capacity that they are able to expire in the first second of expiration. FEF 25-75% indicates the patency of small airways[5].

In this study FVC, FEV1, FEV1/FVC, PEF were less in over weight group and negatively correlated with the visceral fat indicates that, high visceral fat may reduce pulmonary function in overweight individuals.

Six-minute walk test is the simple test to measure the maximal distance that patients can walk at their own pace in 6 min. The test assesses the global functional capacity and is used even for preoperative and postoperative evaluation of patients undergoing lung transplantation and lung volume reduction surgery, to monitor response to therapeutic interventions and pulmonary rehabilitation, and to predict mortality and morbidity in patients with cardiac and pulmonary vascular disorders[6]. In this study the six minutes walk distance was significantly less in overweight group when compared to normal individuals and is associated with visceral fat, it indicates that, visceral fat has the negative effect of functional capacity in overweight individuals with high visceral fat.

The exact mechanisms how visceral affects the cardiopulmonary function is speculative at this time, less attention has been paid to the relationship between visceral fat accumulation and respiratory complications, despite these complications frequently represented an important clinical problem in obese and overweight individuals[7]. An increased amount of fat in the chest wall and abdomen has a predictable effect on the mechanical properties of the chest and the diaphragm and leads to an alteration of respiratory excursions during inspiration and

expiration, reducing lung volume and altering the pattern of ventilation to each region. In addition, the increased mass of fat leads to a decrease in compliance of the respiratory system as a whole. The mass loading effect of fat requires an increased respiratory muscle force to overcome the excessive elastic recoil and an associated increase in the elastic work of breathing[8]. Although the exact molecular mechanisms behind the association of visceral fat with increased cardiovascular risk are unknown, the effect could be due to either anatomical location of the fat within the abdomen or due to the differences in the metabolic properties[9].

Similarly Maiolo et al., studied correlation between FVC and BMI, waist measurement and fat mass[3]. WHR associated with body fat distribution has a correlation with pulmonary function[4]. Correlation between body composition such as body mass index (BMI), waist hip ratio (WHR), fat mass and pulmonary functions is also done by some research workers[10].

The significant outcome of this study is that an association between increased visceral fat and reduced pulmonary function would help in early identification of at-risk individuals. Reduction of visceral fat will be beneficial to prevent cardio pulmonary diseases.

There are limitations to our study, being a cross sectional study, no cause effect inferences can be drawn. Secondly, only bio impedance assay was done to estimate visceral fat. Finally we have not used gold standard measure for functional capacity assessment.

CONCLUSION

This study shows that along with age, gender and body weight, body composition and visceral fat% also affect FVC, FEV1, FEV1/FVC, FEF25-75%, thus it can be concluded that excess visceral fat is associated with reduced pulmonary function and functional capacity in over weight young adults.

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Comparative Study of Bone Mineral Density in Premenopausal and Postmenopausal Women

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ABSTRACT

Aim: The study is aimed to compare the bone mineral content in the premenopausal and menopausal urban women, Who were not on hormone replacement or on any other treatment.

Method: 40 well nourished menopausal women between the age group 40 -68 years were selected as study group and 40 well nourished premenopausal women between the age group 40-55 years were selected as control group. The study was carried out in a camp conducted in Owaisi hospital,where osteoporosis screening camp was organized. The women selected were healthy and had no previous history of diseases such as diabetes, hypertension, carcinomas or renal diseases Care had been taken to select women who did not have previous history of fracture. Calcaneus bone densities were measured by means of Dual Energy X-ray Absorptiometry.

Results: Statistical analysis was done using Unpaired t test. There was a significant decrease in T-score in study group compared to control group.

Conclusion: It is concluded that menopausal women showed significant osteoporotic changes with loss of bone mass.

Keywords: Osteoporosis, menopause, DEXA

INTRODUCTION

The terms menopause, climacteric, peri menopausal are often used interchangeably but strictly applied to different stages at the end of reproductive life in the human female. Menopause is derived from the Greek word - men 'Month' and 'Pauo" to stop and it means the cessation of menstruation. The climacteric is derived from the Greek Klimakter, 'Rung of the ladder' meaning critical period of the life. The climacteric is equivalent of the perimenopause which may start 5 - 1 0 years before the menopause and continues up to 5 - 10 years afterwards.Pre, peri post menopausal apply respectively to the periods immediately before, around after the cessation of menstruation.

The human female is one of the few females of any species in whom reproduction ceases because of exhaustion of oocytes in the ovary before the end of the natural life span.It does not depend on any factor except smokers may have earlier natural menopause.

Menopause and climacteric are primarily due to exhaustion of the stock of primordial follicles or oocytes in the ovary and consequent fall in estrogen and progesterone secretion[1]. It has been calculated that for each single ovum shed, an average of 1000 ovarian follicles develop in each menstrual cycle and eventually become corpora atretica.

There is increased incidence of fractures in menopausal women due to decrease in bone mineral density.

Bone mineral is made of small hydroxyapatite crystals which contain carbonate, magnesium, sodium and potassium. When bone forms in the presense of fluoride ions, fluorapatite crystals are seen in bone mineral which are larger, soluble and may increases bone fragility.

Mineralization occurs by two distinct mechanisms. The initial mineralization of calcified cartilage and woven bone occur by means of matrix

vesicles. These membrane bound bodies are released from chondrocytes and osteoblasts, contain alkaline phosphatase and can form a nidus for crystalization. In lamellar bone the collagen fibres are tightly packed and matrix vesicles are rarely seen. Mineralization does not occur immediately after collagen deposition and there is a layer of 10 – 100nm unmineralized osteoid between the mineralized area and the osteoblast. Mineralization of collagen fibrils begin in the "holezones" where there is more room for inorganic ions to accumulate. Mineralization requires calcium, phosphorus and alkaline phosphatase.

About 75% of bone in the body is compact bone and 25% is trabecular. In trabecular bone nutrients diffuse from ECF in to the trabeculae, but in compact bone nutrients arc provided via Haversian canals which contain blood vessels. Around each Haversian canal collagen is arranged in layers forming cylinders called osteons forming Haversian system. Total blood flow to the bone is 200 - 400 ml/mt in adult human.

MATERIALS & METHOD

The study was carried out in a camp conducted in Owaisi hospital,where osteoporosis screening camp as organized.

Study group: 40 well nourished menopausal women between the age group 40 - 68 years.

Control group: 40 well nourished premenopausal women between the age group 40-55 years.

Inclusion criteria for study group:

1) Nonsmokers

2) Nonalcoholic

3) No History of diabetes, fractures, carcinomas and renal diseases

Inclusion criteria for control group:

1) Regular menstrual cycles

2) Nonsmokers

3) Nonalcoholic

4) No history of diabetes, fractures, carcinomas and renal diseases.

Exclusion criteria:

1) any systemic illness.

2) any acute illness.

3) On calcium supplementation.

All the subjects were explained about the procedure and a written informed consent was taken.

Calcaneus bone densities were measured by means of DEXA machine and T-score compared between both groups.

Equipment: Dual energy X-ray Absoptiometry (Dexa) can provide accurate and reproducible values for bone mineral content (BMC) and density, in the lumbar spine, the proximal femur, the distal radius and the whole body. Bone Mineral Density (BMD) is calculated from the Bone Mineral Content (BMC) and area of bone scanned (g/cm^2). Dexa has many advantages:

Radiation exposure is minimal (<10mrem) and scanning time is short (5-10min) variability of repeat readings in less than 1% for phantom standards less than 2% for lumbar spine, total body, radius and it is at less than 3% for proximal femur[2].

T.Score – Standard Deviation between patient, average peak young adult bone mass. The more negative greater the risk of fracture.

- Normal is a T-score of −1.0 or higher

- Osteopenia is defined as between −1.0 and −2.5

- Osteoporosis is defined as −2.5 or lower.

Statistical Analysis: Statistical analysis was done using unpaired t test and Microsoft excel were used.

P value <0.05 was considered as statistical significant.

The results were expressed as Mean ± Standard Deviation.

FINDINGS

Premenopausal				Menopausal			
Investigation	Mean	SD	T-value	Mean	SD	T-value	P-Value
T-score	-1.84	1.37	0.018	-2.80	1.07	0.018	**0.02**

RESULTS

The mean T-Score for bone density in menopausal women was -2.80 ±1.07 in pre-menopausal women T Score was -1.84 ± 1.37.

The variation of T-Score between the menopausal and pre-menopausal women was significant (P < 0.02).

CONCLUSION

1.There was significant osteoporotic changes in the age group of menopausal women.

2. Menopausal women group showed significant loss of bone mass.

DISCUSSION

ENDOCRINOLOGY OF THE MENOPAUSE AND CLIMACTERIC: Although ovarian follicular depletion is the primary cause of the menopause, the endocrine changes at the climacteric is due to decreased or absent oestrogen, progesterone and compensatory hyperactivity of the hypothalamus and pituitary. The post menopausal women are necessarily oestrogen deficient, though there is the oestrogen secretion from extra ovarian structure like adrenal gland. Changes in other hormones, neurotransmitters such as inhibin, prolactin and catecholamines may be involved in the endocrine changes at the climacteric.

ENDOCRINE CHANGES BEFORE MENOPAUSE:

From about the age of 35 years onwards follicular development tends to become progressively more deficient and in the last 5 - 1 5 years of reproductive life the proportion of anovulatory cycles increases and menstrual cycles may become irregular with unduly long and short cycles.

As the women approaches the menopause the first changes in the ovarian function is either a failure of ovulation or deficient, corpus luteum formation, and the first hormone to become deficient or absent at the climacteric is progesterone.

1. In the first phase of climacteric,hypothalamic pituitary hyperactivity starts 5 - 1 0 years before and continues after the menopause. It is a state of compensatory ovarian failure, premenopausal women aged 46 - 56 with regular menstrual cycles show lower estrodiol levels and higher FSH level than those in younger women at the same stage of cycle. This is due to low levels of estrodiol cause rise in FSH due to negative feedback mechanism of the hypothalamus and pituitary. It is a sign of approaching menopause. They may have lower plasma progesterone levels during luteal phase. This hyperactivity of hypothalamo hypophysial axis compensates for the increase in resistance of the follicle for gonodotrophic stimulation.

2.Ovulatory corpus luteum failure also starting 5 - 1 0 years before menopause - The second phase of climacteric is the failure of ovulation and inadequate corpus luteum formation with absent or inadequate secretion of progesterone. This can result in an unopposed oestrogen secretion which may give rise to Dysfuctional Uterine Bledding(DUB), endometrial hyperplasia and endometrial carcinoma. Follicular development is present without ovulation and corpus luteum formation. This phase can be regarded as partial ovarian failure.

3. Ovarian follicular failure starting at the menopause itself.

4. After menopause plasma oestrodiol stays low although the plasma estrogen and androstenidione, testosterone remain unchanged or may be increased. The extraovarian production of oestrogen from androstenidione is the prominent source of oestrogen 5 - 1 0 years after menopause.The plasma androstenidione and oestrogen begin to fall due to

decrease in ovarian secretion of androstenidione making the women increasingly oestrogen deficient. At the same time gonadotrophin begin to fall from previous high level. This stage can be regarded as truly post stage of menopause

In postmenopausal women increase in L.H and FSH secretion is due to increased secretion of LHRH. The prolonged excessive secretion in course of time, either the hypothalamus is readjusted or pitutary become exhausted resulting in progressive fall in gonodotrophin secretion.

CHANGES IN SKELETAL SYSTEM WITH MENOPAUSE

The association between menopause and oestrogen was first described by Albright and his colleagues 1941. They suggested that loss of ovarian oestrogen at the menopause leads to loss of bone and that administration of oestrogen at the menopause can prevent the bone loss. Oestrogen appear primarily to inhibit osteoclastic activity and bone resorption[3]. They reduce the sensitivity of bone to Para thyroid Hormone(PTH) and increase the sensitivity to calcitonin. There is reported increased in incidence of post menopausal osteoporosis and consequent fracture of spine, femur, radius and ulna. The most characteristic features are vertebral crush fracture leading to loss of height and development of kyphosis, short and hunch backed appearance.

Osteoporosis[4,5]: Internationally accepted definition describes osteoporosis as a progressive systemic disease characterised by low bone density and microarchitectural deteriorisation of bone tissue with consequent increase in bone fragility and susceptibility to fracture.

Bone is a very active organ. A continuous process called bone remodeling, involves constant resorption (osteoclastic activity) and bone formation (osteoblastic activity). Both osteoblasts and osteoclasts are derived from bone marrow progenitors osteoblasts from mesenchymal stem cells and osteoclasts from haemopietic white cell lineage. Cytokines are involved in this development process, the process regulated by the sex- steroids.

The amount of bone at any stage reflects the balance of the osteoblastic and osteoclastic

forces influenced by a multitude of stimulating and inhibiting agents. Aging and a loss of oestrogen both lead to excessive osteoclastic activity. A decrease in calcium intake or absorption lower the serum level of ionized calcium. This stimulates PTH secretion which mobilizes calcium from bone by direct stimulation of osteoclastic activity. Increased PTH also stimulates the production of Vit. D active metabolite to increase intestinal calcium absoprtion[6]. Calcium ions increases in the blood and PTH levels return to normal. A deficiency in oestrogen is associated with greater responsiveness of bone to PTH.

Osteopenia: It indicates low bone mass.

The International Osteoporosis Foundation suggests screening of women after age of 65 years. However, changing life style in young people (dieting, smoking, and lack of exercise) has made them vulnerable to osteoporosis at an earlier age. Further in India, there is a higher prevalence of other risk factors such as low socioeconomic strata, low calcium in the diet, Vitamin D deficiency, low education level, premature menopause, multiparity, and extended lactation, putting women at higher risk for osteopenia and osteoporosis[7].

NEW INSIGHTS INTO THE PATHOGENESIS OF OSTEOPOROSIS:

Post menopausal osteoporosis is primarily caused by oestrogen deficiency. The reduction in bone mass eventually leads to deterioration of the microarchitecture of bone tissue and thus reduced bone quality.

THE PATHOGENIC MECHANISM RESPONSIBLE ARE

1.50% decrease in calcium absorption (Vit. D receptor deficiency,Vit D-hormone deficiency, calcium malabsorption of unknown mechanism).

2.Apoptosis of osteoclasts reduced (TGFβ)

3.killer osteoclasts increased

4.Cytokines (IL-I,IL-6,TNFα)[8] increased (osteoblasts reduced)

CONSEQUENCES

1.Impairment of bone mineralisation

2.Decoupling of bone remodeling

3.Perforation of the spongy plates

4.Trabecular disconnections

Early impairment of bone quality (bone fragility) and increase in vertebral fracture. Increased release of cytokines is of causal significance in post menopausal osteoporosis. This has been established by various studies.On the other hand interlenkin-1 (IL-1), IL-6 and the dominent tumor necrosis factor alpha (TNFα) which stimulates other bone damaging cytokines, stimulate bone resorption[8]. TNFα has also been identified as an effective inhibitor of bone formation by inducing apoptosis of osteoblasts (Programmed cell death).

There is increased helper/supressor T-cell ratio which activate osteoclasts.

Osteoclasts activity is furthermore promoted by the drop in oestrogen levels. Which leads to reduced transforming growth factor Beta (TGFβ) mediated osteoclast apoptosis[9].

Indirectly, Histomorphological findings have indicated that killer osteoclasts (i.e., osteoclasts with above average bone resorption activity) might also play a role.

Abraham and hamsen B[10] et al have studied osteodensitometry of 2005 healthy post menopausal women. Women having mean age group of 50.6 years were studied using Hologic QDR - 1000AV and QDR 2000 densitometer. The prevalence of osteoporosis was 1.2% when femur total Bone Mineral Density (BMD) was considered alone and 5.9% when Lumbar densitometry was included. However as many as 7.9% showed osteoporosis of the femoral neck when Hologic 'T' score was used. A combination of spinal and femoral densitometry should be used in diagnosing osteoporosis, though this increase the prevalence of osteoporosis by 50% or more in perimenopausal women.

Heshmatt[11] et al concluded that all post menopausal women are estrogen deficient. Post menopausal women with osteoporosis have a PTH - independent defect in renal calcium conservation. This defect is of sufficient magnitude to contribute to the greater negative calcium balance in post menopausal women with osteoporosis Vs their post menopausal women without osteoporosis.

Honseh[12] et al have done study on spontaneous bone loss in two population of healthy post menopausal women, who were followed for 9.5 and 14.5 years without any treatment influencing the calcium metabolism. The bone mass was measured in different skeletal areas. The patterns of bone loss were, however different for axial and peripheral skeleton. Bone loss averaged 20 - 25% over the initial 6 years of menopause regardless of skeletal site. The bone loss in distal forearm was more linear and more consistent through the observation period.

Prince RL[13] et al have done a cross sectional study on 655 healthy women aged 35 to 90 years, following menopause there is an deccrease in bone turn over and increased urine calcium loss independent of effect of PTH and calcitriol suggesting a direct effect of estrogen deficiency on bone and kidney.

Albert U, Beckman MW[14] et al conducted a study on age related changes using qualitative ultrasound sonometry (QUS) in a large sample of healthy German women. Speed of sound (SOS) broad band ultrasound attenuation (BUA) of the calcaneum were measured in 1333 women (mean age 50.5+/- 11.5 years) using a Achilles ultrasonometer. Post menopausal women showed a slightly larger decline of Bone mineral density and were at increased risk of fracture.

It is concluded from this study that the postmenopausal women have decreased bone mineral density as a result of loss of bone mass and they are at increased risk of fractures.It is advised that postmenopausal women should undergo regular checkups,should be investigated for bone mineral density and treated appropriately to prevent complications of bone loss.

Ethical Clearance: Taken from Scientific Ethical committee, Osmania Medical College,Koti,Hyderabad,Telengana

Conflict of Interest - Nil

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Effect of Isometric Hand Grip (IHG) Exercise Training on Cardiovascular and Echocardiographic Parameters among Pre-hypertensive Young Males

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ABSTRACT

Aim: To evaluate the effect of IHG training of 5 weeks on cardiovascular and echocardiographic parameters among prehypertensive young males.

Method: 30 prehypertensive males of age group 24.00 ± 2.38 years were included in the study. They were asked to perform IHG exercise for a period of 5 weeks. Cardiovascular parameters were recorded at the start, during the training and at the end of the training, while the echocardiographic parameters were recorded before and at the end of training.

Results: Significant decrease observed in SBP, DBP, MAP, HR, RPP (rate pressure product) both at rest and at 2min of IHG exercise. Heart rate recovery at 1min increased significantly after the training. Echocardiography showed increment in interventricular septum thickness, left ventricular posterior wall thickness and left ventricular ejection fraction; and significant decrement in left ventricular end systolic diameter and volume.

Conclusion: IHG training resulted in improvement of cardiovascular parameters and positive cardiac morphological and functional adaptation, resulting decrease in cardiovascular stress, both at rest and during exercise.

Keywords: Prehypertension, Isometric Hand Grip training, echocardiography.

INTRODUCTION

Prehypertension is one of the important public health challenges, all over the world. It is responsible for approximately 62% of cardiovascular disease (CVD) and 49% of ischemic heart disease as per WHO [1]. It is a condition which heralds hypertension and may be considered as a starting point in cardiovascular disease continuum [2]. As compared to normotensive subjects, the cardiovascular risk factors were present

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in a higher proportion in prehypertensives (56%) [3,4].

The progression of hypertension from prehypertension is multifactorial in nature. One of the strong and independent predictors of the rate of progression from prehypertension to hypertension is exercise capacity [5-8].

Isometric hand grip exercise is a form of static resistance exercise, characterized by a change in muscle tension while the muscle length remains constant. This exercise resulting in compression of blood vessels and occlusion of blood flow to the active muscle [9].

IHG is a very simple form of exercise which requires little adjustment in daily routine & time. This may help to ease some of the barriers to exercise, and increase patient adherence [10-14].

There are a few studies conducted to evaluate the blood pressure lowering effect of isometric handgrip exercise training in prehypertensive individuals. Hence the present study was planned to study the beneficial effects of isometric hand grip exercise training in lowering their blood pressure.

MATERIALS & METHOD

The study was carried out in the Department of Physiology, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun over a period of 12 months. Study group was recruited from the students, employees of Swami Rama Himalayan University and residents of Bhaniyawala. Male subjects were recruited after taking written and informed consent (aged between 20 to 40 years). A sample size of 30 was obtained using the formula for differences of means at 90% power and α error of 0.05 [15]. Inclusion & exclusion criteria were followed.

The study was approved by the ethical committee of the institute.

The subjects were asked to report in the department of physiology at 9:00 am. A structured case reporting form was designed to generate required data. Age (years), sex, height (in cm), body weight (in kg), BMI (in kg/m^2), relevant medical history and examination findings were noted.

The subject was asked to squeeze a hand grip dynamometer (model no.105 INCO) with maximum isometric effort using the dominant hand, and maintained for at least 5 sec, for obtaining maximum voluntary contraction (MVC). MVC was determined as the highest value obtained on three attempts, separated by 1 minute rest periods. Subject was trained to perform sustained handgrip at 30% of MCV for 3 minutes for 4 times, separated by a rest of 5 minute period. He was asked to breathe continuously, during the exercise session. The above protocol was performed for 4 days per week for 5 weeks [16]. On day 0th, 8th, 22nd and 36th of IHG exercise training heart rate and blood pressure were recorded:

Blood Pressure Apparatus (model no. EW 254 DC6V) was used.

Echocardiography:

On day 0th and 36th of IHG exercise training following parameters were recorded: resting Left atrium size, left ventricular end diastolic volume, left ventricular end systolic volume, left ventricular end diastolic diameter, left ventricular end systolic diameter, inter ventricular septum, left ventricular ejection fraction and Left ventricular post wall thickness. Echocardiograph (Model Philips HD11XE SNo.US 11270001) was used.

Statistical Package for Social Science version 20 software was used for data analysis. ANOVA with Bonferroni post hoc test was used to show the effect of training on cardiovascular parameters. Paired t test was used for the echocardiographic parameters comparison between the 0th day and the 36th day. The level of Significance was set at P<0.05.

RESULTS

Anthropometric parameters are shown in Table 1.

IHG exercise training of 5 weeks resulted in statistically very highly significant decrease in resting systolic blood, resting diastolic blood pressure, resting MAP, resting heart rate, and resting rate pressure product. However, resting pulse pressure increased, but was insignificant.

IHG exercise training of 5 weeks resulted in statistically very highly significant decrease in SBP at 2nd min of exercise, DBP at 2nd min of exercise, heart rate at 2nd min of exercise, RPP at 2nd min of exercise and heart rate after 1 min of exercise. There was very highly significant increase in heart rate recovery (Table 2).

IHG exercise training of 5 weeks resulted in statistically significant increase in interventricular septum thickness, very highly significant increase in left ventricular posterior wall thickness and left ventricular ejection fraction. There was statistically highly significant decrease in left ventricular end systolic diameter and left ventricular end systolic volume. Increase in left atrial size, left ventricular end diastolic diameter and left ventricular end diastolic volume was statistically insignificant (Table 3).

DISCUSSION

IHG exercise training resulted in statistically significant decrease in resting systolic blood pressure,

resting diastolic blood pressure, resting MAP, resting heart rate, and resting rate pressure product. However, resting pulse pressure increased which was statistically insignificant.

Similar findings have been reported by Carlson DJ et al [17] and Millar PJ et al [18]. While, Wiley RL et al reported significant reduction in systolic and diastolic blood pressure among prehypertensives after IHG exercise training of 8 weeks [11]. The significant reduction in resting heart rate and blood pressure after IHG exercise training may be due to decrease in sympathetic activity and increase in parasympathetic activity , or increase in the activity of both the autonomic branches [19]. The repetitive episodic increase in endothelial cells shear stress due to IHG exercise training increases eNOS (endothelium nitric oxide synthase) gene transcription, resulting in increased nitric oxide formation [20]. This along with decreased sensitivity to the vasoconstrictor effects of norepinephrine after training [21], results in arteriole smooth muscle relaxation and vasodilatation. After training, there is also decrease in percentage of maximal voluntary contraction necessary to obtain a sub-maximal absolute force or workload, as the absolute maximal strength increases. The reduction in rate pressure product after IHG exercise training indicated decrease myocardial oxygen demand. This may be due in part to training induced reduction in total peripheral resistance and hence reduced after load, and reduction in myocardial wall tension.

IHG exercise training of 5 weeks resulted in statistically very highly significant decrease in SBP at 2nd min of exercise, DBP at 2nd min of exercise, heart rate at 2nd min of exercise, RPP at 2nd min of exercise and heart rate after 1 min of exercise. There was very highly significant increase in heart rate recovery . The decreased acute response in HR, SBP, DBP and MAP to IHG exercise has been noted earlier in trained individuals . The acute rate pressure product response to exercise and improvement in heart rate recovery has also been reported to decrease after training [22]. The reduction in cardiovascular parameters including heart rate response during exercise, as an adaptation to training, was noted among the hypertensives also [23].

The reduction in heart rate and blood pressure response during IHG exercise indicates decrease stress on cardiovascular system and hence a positive adaptation of the exercise training . Since blood pressure response to handgrip exercise is an important sympathetic function test, our result indicates a decrease in sympathetic activity [24].

IHG exercise training of 5 weeks resulted in statistically significant increase in interventricular septum thickness, very highly significant increase in left ventricular posterior wall thickness and left ventricular ejection fraction. There was statistically very highly significant decrease in left ventricular end systolic diameter and volume. However, statistically insignificant increase was observed in case of left atrial size, left ventricular end diastolic diameter and left ventricular end diastolic volume .Adler Y et al reported increase in interventricular septum and left ventricular posterior wall thickness after isometric or static exercise training or in static exercise trained individuals [25]. The improvement in left ventricular systolic function as indicated by increase in left ventricular ejection fraction after training has also been reported earlier [26] .

In our study, the improvement in cardiac contractility was shown by the very highly significant decrease in left ventricular end-systolic diameter and volume with insignificant increase in end-diastolic diameter and volume .

However, the increase in left ventricular thickness and hence possibly mass was not associated with any decrease in left ventricular end-diastolic diameters or volumes , indicating decrease in left ventricular diastolic function, which is common in cases of pathological pressure overload conditions caused by hypertension or cardiac hypertrophy in various forms of cardiomyopathy [27]. The positive cardiac adaptation is significant especially for the prehypertensives, as their hearts are already exposed to much stress due to pathological pressure overload and unfavorable cardiac remodeling .

CONCLUSION

The result suggests that such type of training can be successfully used as a safe non pharmacological method for prevention of progression of prehypertension to full blown hypertension and associated morbidities.

Table 1. Baseline anthropometric and cardiovascular parameters of the subjects (n=30)

S. No.	Parameters	Mean ± SD
1	Age (years)	24.00 ± 2.38
2	Height (cm)	170.83 ± 6.28
3	Weight (Kg)	69.97 ± 5.28
4	BMI (Kg/m^2)	23.88 ± 0.37

Table 2. Effect of duration of isometric exercise training on blood pressure at 2nd min. of exercise, heart rate at 2nd min. of exercise, rate pressure product at 2nd min. of exercise; and heart rate recovery among the subjects (n=30).

S No	Parameters	0th Day (Mean±SD)	8th Day (Mean±SD)	22nd Day (Mean±SD)	36th Day (Mean±SD)		p-value
1	SBP at 2nd min of exercise (mmHg)	148.17 ± 8.62 (131-161)	143.90 ± 7.96 (130-160) ***	138.97 ± 6.67 (124-150) ***###	135.13 ± 6.46 (122-148) ***###^^^		0.0001
2	DBP at 2nd min of exercise (mmHg)	100.80 ± 9.86 (88-142)	94.50 ± 6.27 (86-116) ***	89.77 ± 6.13 (80-101) ***###	86.30 ± 7.15 (74-100) ***###^^^		0.0001
3	Heart rate at 2nd min of exercise (beats per min)	111.50 ± 8.92 (96-124)	110.17 ± 8.85 (95-122) ***	107.10 ± 8.05 (95-118) ***###	103.80 ± 7.92 (94-118) ***###^^		0.0001
4	RPP at 2nd min of exercise (mmHg per min)	16515.10 ± 1581.85 (13152-19320)	15860.00 ± 1632.56 (12730-19520) ***	14899.87 ± 1506.63 (12400-17700) ***###	14036.90 ± 1380.97 (11956-17228) ***###^^^		0.0001
5	Heart rate after 1 min of exercise (beats per min)	98.40 ± 7.93 (86-110)	95.83 ± 7.72 (84-108) ***	91.60 ± 6.89 (81-104) ***###	86.97 ± 5.62 (79-100) ***###^^^		0.0001
6	Heart Rate Recovery (beats per min)	13.10 ± 4.79 (8-24)	14.33 ± 4.73 (10-28) ***	15.50 ± 4.33 (11-26) ***###	16.83 ± 4.55 (11-29) ***###^^^		0.0001

p<0.05 - significant, p<0.01- highly significant, p<0.001 very highly significant. Repeated measure ANOVA with Bonferroni post hoc test. *Comparison with 0th day, # with 8th day and ^ with 22nd day. 1to3symbols indicate 'significant to very highly significant' difference.

Table 3. Effect of isometric exercise training on cardiac functions assessed by echocardiography among the subjects (n=30)

S. No.	Parameters	0 Day (Mean ± SD)		36 Day (Mean ± SD)		p-value
1	Left atrial size (cm)	3.09 ± 0.26		3.11 ± 0.25		0.083
2	Interventricular septum thickness (cm)	0.92 ± 0.08		0.94 ± 0.08		0.031
3	Left ventricular posterior wall thickness (cm)	0.91 ± 0.09		0.94 ± 0.09		0.000
4	Left ventricular end diastolic diameter (cm)	4.43 ± 0.21		4.44 ± 0.22		0.083
5	Left ventricular end diastolic volume (ml)	103.60 ± 10.83		103.78 ± 10.84		0.074
6	Left ventricular end systolic diameter (cm)	3.08 ± 0.25		2.99 ± 0.25		0.0001
7	Left ventricular end systolic volume (ml)	40.91 ± 5.12		40.53 ± 5.05		0.0001
8	Left ventricular ejection fraction (%)	60.37 ± 4.62		60.79 ± 4.57		0.0001

$p > 0.05$ -non significant, $p < 0.05$ – significant, $p < 0.01$- highly significant, $p < 0.001$- very highly significant. Paired t test.

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PR Interval in Males and Females of Same Age Groups

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ABSTRACT

Introduction: PR interval is the important ECG parameter dependent on the heart and it indicates time required for conduction from atria to the ventricle. Physiological parameters show variations in normal subjects. The Physiological parameters also show gender variations. This study was conducted to compare the PR interval in males and females of same age groups.

Objective: To study and compare PR interval in males and females of same age group

Methodology: Males and females of age from 20 years to 80 years were studied. ECG in lead II was recorded using Power lab 8/30 series

Statistical Analysis: Mean standard deviation and proportion was used to present the data. Student't' test was done. Pearson's correlation coefficient 'r' was used to examine relationship between ECG changes with difference age groups. A two tailed p-value less than 0.05 will be considered as significant.

Results: PR interval increases as age increases. Prolongation of PR interval in females compared to males of same age group

Conclusion: PR interval may be prolonged even in clinically healthy individuals. As PR interval is determining conduction from atria to ventricles, individual with prolonged PR interval must have regular follow up for early detection of cardiovascular problem as degenerative changes are occurring with increasing age.

Keywords: ECG, PR interval

INTRODUCTION

Even in completely normal individuals the Physiological parameters show variations. In same person many Physiological parameters show diurnal variations. Again gender variations are also seen. PR interval is important ECG parameter which determines conduction from atria to ventricles.PR interval indicates the interval between the electrical excitation of the atria and the beginning of electrical excitation of the ventricles. PR interval is the time between the beginning of the P wave and the beginning of QRS complex.PR interval changes with heart rate. PR interval is prolonged when heart rate is less and PR interval is decreased when heart rate is increased. The normal PR interval is in the range of 0.12 - 0.28 sec. In first degree heart block PR interval is prolonged up to 0.30 sec. The first degree heart block is due to delay of conduction from atria to ventricles but blockage of conduction is not seen. When PR interval increases above 0.35 sec to 0.45 seconds, conduction through the AV bundles is severely depressed and conduction stops entirely. Thus PR interval is very useful parameter to determine severity of heart disease.[1] The Physiological parameters also show variations at different age groups. So this study was done to compare PR interval in males and females of same age group.

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METHODOLOGY

The study was done in Jan 2012 to May 2013, at department of Physiology Navodaya Medical College Raichur, Karnataka, India. The healthy male and female subjects of different age groups were included in the study. The subjects were recruited from general population in and around Raichur. Ethical clearance was obtained from the Navodaya Medical College Ethical Committee for Human Research to conduct the study. Written consent was obtained from the participants after explaining them the purpose of the study and details of the procedure.

Method of collection of data:

For all the subjects a detailed history followed by clinical examination was carried. As blood pressure is major factor influencing cardiac functions, blood pressure was measured in supine position after 5 minutes rest. Three readings were taken and mean of three readings was taken.

Recording of ECG

After explaining the procedure the subjects were asked to take rest for 10 minutes. Then Lead II ECG was recorded on all subjects in supine position in an ambient temperature for 3 minutes by using Power lab 8/30 series with dual bio amplifier (Manufactured by AD instruments, Australia with model no ML870). And the analysis of the ECG was done by the software in the same instrument.

Inclusion criteria:

Healthy male and female adults in the age group 21 to 80 years.

Exclusion criteria:

H/O any systemic diseases like Hypertension, Heart diseases, Diabetes mellitus;

H/O Smoking, alcohol consumption and medication

150 (75 males and 75 females) subjects who satisfied the inclusion and exclusion criteria were recruited. All the subjects were divided into different subgroups according to their sex and age.

Males were divided into three subgroups according to age:

Group I: 21 – 40 years (25)

Group II: 41 – 60 years (25)

Group III: 61 – 80 years (25)

Female were divided into three subgroups according to age:

Group I: 21 – 40 years (25)

Group II: 41 – 60 years (25)

Group III: 61 – 80 years (25)

RESULTS

Statistical Analysis: Mean standard deviation and proportion was used to present the data. Student't' test was done. Pearson's correlation coefficient 'r' was used to examine relationship between ECG changes with difference age groups. A two tailed p-value less than 0.05 will be considered as significant.

Table 1: Comparison of blood pressure between males of different age groups

Parameters	Group I	Group II	Group III	Post hoc multiple Comparison
SBP (mm of Hg)	119.36 ± 10.48	126.32 ± 5.37	129.2 ± 6.16	Gr I vs II, p<0.01* Gr I vs III, p<0.001* Gr II vs III, p>0.05
DBP (mm of Hg)	74.7 ± 7.11	84.24 ± 6.28	84.8 ± 4.86	Gr I vs II, p<0.001* Gr I vs III, p<0.001* Gr II vs III, p>0.05

* Statistically significant

There was statistically significant difference in SBP when compared between group I and II . There was statistically significant difference in DBP when compared between group I and II and between group I and III

Table 2: Comparison of blood pressure between females of different age groups

Parameters	Group I	Group II	Group III	Post hoc multiple Comparison
SBP (mm of Hg)	115.8 ± 6.2	120.8 ± 9.6	129.7 ± 13.4	Gr I vs II, p>0.05 Gr I vs III, p<0.001* Gr II vs III, p<0.001*
DBP (mm of Hg)	74.6 ± 6.3	79.04 ± 5.7	81.04 ± 5.75	Gr I vs II, p<0.05 Gr I vs III, p<0.001 Gr II vs III, p>0.05

* Statistically significant

There was statistically significant difference in SBP when compared between group I and III and between group II and III. There was statistically significant difference in DBP when compared between group I and II and between group I and III.

Table 3: Comparison of blood pressure between males and females

Group	Parameters	Male	Female	p-value
Group I	SBP(mm of Hg)	119.36 ± 10.5	115.84 ± 6.2	P=0.15
	DBP(mm of Hg)	74.7 ± 7.11	74.6 ± 6.3	P=0.96
Group II	SBP(mm of Hg)	126.3 ± 5.37	120.8 ± 9.59	P=0.01*
	DBP(mm of Hg)	84.24 ± 6.28	79.04 ± 5.72	P=0.004*
Group III	SBP(mm of Hg)	129.2 ± 6.2	129.76 ± 13.4	P=0.85
	DBP(mm of Hg)	84.8 ± 4.86	81.04 ± 5.75	P=0.02*

*Statistically significant

In group I There was statistically insignificant decrease in SBP in females compared males. There was statistically insignificant decrease in DBP in females compared males. In group II there was statistically significant decrease in SBP as well as DBP in females compared males. In group III there was statistically insignificant increase in SBP in females compared males. There was statistically significant decrease in DBP in females compared males.

Table 4: Comparison of PR interval between males of different age groups

	Group I	Group II	Group III	P value
PR Interval (s) in males	0.12 ± 0.03	0.14 ± 0.02	0.21 ± 0.2	Gr I vs II, p>0.05 Gr I vs III, p<0.05* Gr II vs III, p>0.05

* Statistically significant

PR interval was within normal range in all the age groups. There was prolongation of PR interval with increase in age. This prolongation was statistically significant when compared between group I and group III.

Table 5: Comparison of PR interval between females of different age groups

	Group I	Group II	Group III	P value
PR Interval (s) in females	0.13 ± 0.06	0.14 ± 0.04	0.15 ± 0.03	Gr I vs II, p>0.05 Gr I vs III, p>0.05 Gr II vs III, p>0.05

PR interval was within normal range in all the age groups. There was prolongation of PR interval with increase in age. But this prolongation was statistically insignificant.

Table 6: Comparison of ECG Parameters between males and females in all groups

Group	Parameters	Male	Female	p-value
Group I	PR Interval (s)	0.12 ± 0.03	0.13 ± 0.07	P=0.69
Group II	PR Interval (s)	0.14 ± 0.02	0.14 ± 0.04	P=0.45
Group III	PR Interval (s)	0.21 ± 0.20	0.15 ± 0.03	P=0.14

* Statistically significant

In all groups there was statistically insignificant prolongation of PR interval in females compared males

DISCUSSION

Aging is normal Physiological process. Many changes occur in body systems even in absence of disease. Response of individuals to aging may be different as it is affected by many factors. These factors include health, life style and genetic makeup of the person. As age increases blood pressure also increases. There are also gender variations in blood pressure trends. In women's blood pressure is lower than men it increases by the sixth decade, and frequently becomes slightly higher thereafter. The increase in blood pressure with age is mostly associated with structural changes in the arteries and especially with large artery stiffness [2, 3, 4]. In our study there was increase in both SBP and DBP with ageing in both males and females. As age advances, degenerative changes also occur in cardiac muscles, conduction system of heart. Fat and fibrous tissue deposition occurs in conduction system pathways. Functionally it leads to prolonged myocardial contraction and relaxation time. The number of pace maker cells in SA node is reduced, leads to reduced heart [5]. In our study as age increased PR interval show prolongation. The mean recorded values of PR interval (in sec) were 0.14±0.02 and 0.14±0.04 in males and females respectively. There was statistically insignificant prolongation of PR interval in females compared males. In a study by Chamberlain and Hay, ECG of 302 subjects were studied, in few subjects the P-R interval was prolonged up to 0.22 seconds [6]. There are few other studies showing small but significant increase in PR interval with age [7] but in some studies it is not seen[8]. In study done by Datey and Bharucha there was no trend in PR Interval in any of the electrocardiographic leads [9]. Many authors reported a small increase in PR interval in aged person in different leads without any obvious clinical significance. Prolongation of PR interval generally reveals prolonged A-V conduction with A-V nodal block [10]. It has also been suggested that age related electrocardiographic changes may be due to coronary artery diseases. The incidence of abnormal ECG increases with age as the incidence of clinical heart disease increases.[11]Recent studies have shown that in ischemia, conduction of A-V node is accelerated, and leads to decreased PR interval in ischemia [12]. In thyrotoxic periodic paralysis PR interval may be prolonged[13]. In our study we observed prolonged PR interval in females than males, but it was statistically insignificant. We could not find any cause for prolonged PR interval in females compared males of same age group.

CONCLUSION

PR interval increases with advancing age. Along with cardiac cause, other conditions also cause change in duration of PR interval. Therefore Prolonged PR interval subjects even though clinically normal, should be investigated and asked regular follow up to detect early cardiac problem

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Comparison of Intraocular Pressure in Normal & Obese Post-menopausal Women

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ABSTRACT

Aim: To find out the Comparisonof intraocular pressure in normal and obese postmenopausal women.

Materials and Method: The Comparison of intraocular pressure is observed in 100 postmenopausal subjects in Chettinad Hospital and Research institute, Chennai.

Result: Out of 100 subjects, in obese postmenopausal subjects intraocular pressure is slightly increases but within normal limit.

Conclusion: It finally concluded as awareness of intraocular pressure in obese postmenopausal women.

Keywords: intraocular pressure, postmenopause, eye.

INTRODUCTION

Intraocular pressure (IOP) is the fluid pressure of the aqueous humour inside the eye. Physiologically, IOP is determined mainly by the balance between the production of aqueous humour and its drainage through the trabecular meshwork located in the anterior chamber angle. Normal range is 10-20mm Hg. [1,2]. This aqueous humour also nourishes cornea, iris and lens and help in maintaining the normal globular shape of the eye. The Intraocular pressure when exceeds the normal range is said to be Ocular hypertension. Increased IOP is typically the consequence of blockage (or) alteration of the outflow system. A rise in IOP offers the first sign in the diagnosis of *Glaucoma* [1,2].

Menopause is the final and permanent cessation of menstruation. Menopause is not a disease or an illness but a transition between two phases of a women's life. It marks childbearing years of the female. For most women menopause occurs at about age 50 but every women's body has its own timeline. This would explain that while some women stop having their periods in their mid-forties others continue well into their fifties. After menopause there is gradual progressive atrophy of gonads and accessory sex organs.At the time of menopause, a women re adjust her life from one that has been physiologically stimulated by estrogen and progesterone production to one devoid of these hormones. The loss of estrogen often causes marked physiological changes in the body function and no exception for eye also.

Various eye changes may occur during times of fluctuating hormone levels, such as during the menstrual cycle, pregnancy, and pre-menopause. Around the time of menopause, your eyesight may be slightly altered. Eye shape may also change slightly, making contact lenses less comfortable and increasing the need for corrective lenses for reading. Other problems of the eyes are common after midlife and menopause. [3]

After menopause, some women report chronically dry and scratchy eyes, often along with light sensitivity, blurred vision, increased tearing, or swollen or reddened eyelids—a condition called "chronic dry eye syndrome."[3].

After menopause, some women report chronically dry and scratchy eyes, often along with light sensitivity, blurred vision, increased tearing or swollen or reddened eyelids – a condition called "chronic dry eye syndrome".

MATERIALS & METHOD

This study was a carried out 100(after 2 years of menopause) completepostmenopausal women recruited were members of Chettinad Hospital workers and their neighbours and volunteers. And history of the participant along with the details of other personal history that includes family history of glaucoma, any other complaints of the eye, past and present illness, medications etc., were collected with the help of a questionnaire. Intraocular pressure was measured with the handheld of **Non-contact Tonometer**. IOP was measured both eyes separately.

The test was carried out between 10- 11 AM. Each time to avoid diurnal variation. The values used were for both eyes separately. The data obtained was analyzed with SPSS version 15.0.

RESULTS

In this project, 100 subjects were participated. And according to BMI and segregated into two groups- *normal* and *obese* subjects. It was compared on these subjects if any IOP changes or variations existed between normal weight and obese on postmenopausal women. Obesity is also included in our project by taking BMI. Finally, I got 50 obese and 50 normal subjects. Right eye IOP compared separately between normal and obese subjects [*figure 1*] and left eye IOP compared between normal and obese subjects [*figure- 2*].

**Table – 1: Descriptive statistical analysis of IOP on obese and normal subjects.**

	N	Minimum	Maximum	Mean	Std. Deviation
IOPR1	58	10.00	20.00	14.3276	2.71052
IOPL1	58	10.00	20.00	14.4655	2.62388
BMI1	58	17.80	24.80	22.6397	1.88995
IOPR2	42	10.00	20.00	16.4524	2.71583
IOPL2	42	11.00	19.50	16.3810	2.58704
BMI2	42	25.00	34.90	26.9476	2.33491
Valid N (listwise)	42				

[**IOPR1**= Right eye of Normal subjects; **IOPR2**= Right eye of Obese subjects

IOPL1 = Left eye of Normal subjects; **IOPL2** = Left eye of Obese subjects]
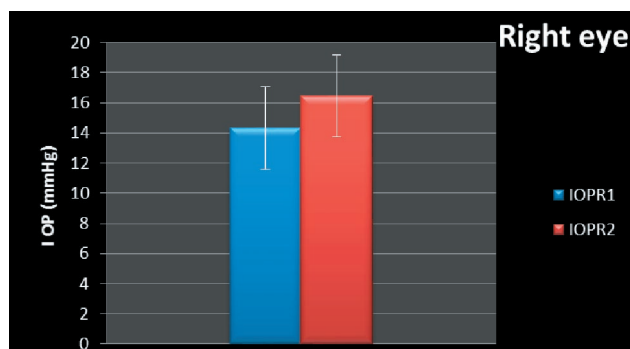
Figure – 1: Comparison of Intraocular pressure in Right eye in obese and normal subjects.
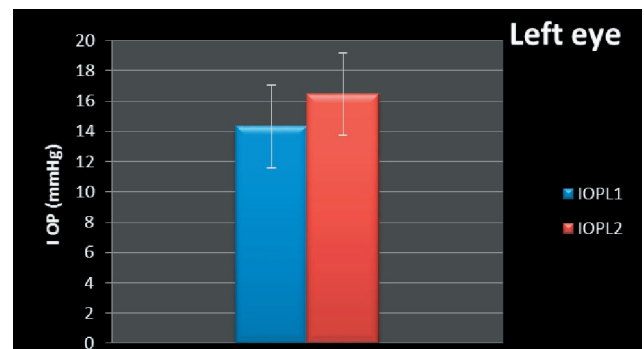
Figure – 2: Comparison of Intraocular pressure in Left eye in obese and normal subjects.

Table-2: Correlation between the IOP pressure in obese and normal subjects.

Left eye		IOPL1	IOPL2
IOPL1	Pearson Correlation	1	.008
	Sig. (2-tailed)		.960
	N	58	42
IOPL2	Pearson Correlation	.008	1
	Sig. (2-tailed)	.960	
	N	42	42
Right eye		IOPR1	IOPR2
IOPR1	Pearson Correlation	1	.170
	Sig. (2-tailed)		.283
	N	58	42
IOPR2	Pearson Correlation	.170	1
	Sig. (2-tailed)	.283	
	N	42	42

[IOPR1=Right eye of Normal subjects; **IOPR2** =Right eye of Obese subjects

IOPL1 = Left eye of Normal subjects; **IOPL2** = Left eye of Obese Subjects**]**

(In the classified groups above, variations or changes in IOP with reference to BMI have been evaluated. It was found out to have no statistical significance.)

DISCUSSION

The relationship between the intraocular pressure and postmenopausal women has been studied since years. First of all the study of relationship between the gonadal functions on IOP was done by Imre in 1920[4] Hence it is clear that there is definite relationship between the female sex hormones and IOP that it regulates and plays a protective role. Women in general have thinner cornea than men [5]. Increased risk of glaucoma is in post menopausal women. Neuroprotective effect of oestrogen proved to be beneficial in glaucoma patients (retinal ganglion cell death)[6] Secretion of sex hormones by ciliary epithelium – indicates its relation to IOP [7] Physiological regulations of IOP by other hormones like corticotrophin, glucocorticoids & mineralocorticoids have been proved [8] Increased risk in post menopausal women may be due to lack of hormones in the reproductive period- proving the relationship

.Besides hormonal influence, corneal thickness also has a role in influencing IOP. Thinner cornea has a higher risk for primary angle glaucoma than thicker corneas [9].

This study was carried out to find the intraocular pressure in postmenopausal women in Chennai. In postmenopausal stage, sex hormones are decreased and IOP may be increased or decreased due to hormonal imbalance. Some of the articles proved IOP increase in postmenopausal stage. So we took 100 normal postmenopausal women. In these subjects IOP was measured by non-contact tonometer at between 10-11am. We are tried to detect the causes at the stage of postmenopausal women. And these subjects are classified normal and obese by using (Body Mass Index) BMI. [Based on*park's textbook of prevention and social medicine (19th Edition)*]. To detect in these subjects of there is any changes between normal and obese.But there is no correlation between them. IOP is within normal limits. In Most of the studies comparisons on various factors were done on single eye or Mean of the both. **Our studies were done in both eyes separately**. And above the studies no one did it in **Indian** population. So, our study to detect whether IOP increase or decrease on postmenopausal women in **Indian** population.

The increase in IOP was statistically significant at the 0.05 level of significance– the mean increase was from 15 mm Hg to 18.2 mm Hg.[10] There are

also studies proven to reduce the elevated IOP in postmenopausal women which shows the protective role of these hormones in the regulation and pathogenesis of glaucoma [6, 9, 11, 12 &13] The risk of the postmenopausal women for ocular hypertension may be due to the lack of the hormones. And some of the articles IOP decreased in postmenopausal stage due to the HRT. Those age-induced changes on quality and amount of tears, IOP and retro bulbar blood flow are intensified by the menopause and that it may be possible to decrease the menopausal effects on these parameters by HRT[14] The effects of hormone replacement therapy (HRT) on ocular symptomatology, lachrymal secretion, IOP, and corneal thickness in postmenopausal women. [15] some studies accuracy of IOP changes on the exercise. Acute dynamic exercise seems to change IOP through changes in plasma colloidal osmotic pressure. [16] The amount of IOP reduction after short term exercise seems to depend on the intensity of exercise, not on the duration of the quantity of exercise. [17] Aerobic exercise is associated with a reduction in elevated intraocular pressure [18] The physical fitness causes significant attenuation in the intraocular pressure [19] The intensity of exercise seems to be responsible for the magnitude of the decrease in the resting intraocular pressure after short term exercise.[20] In our project enquiry about exercise via questionnaire. Women generally have thinner corneas than men, which may have contributed for the mild increase in IOP. Along with this fact, blinking of eye influences IOP [21] Lens wearing women seemed to have increased progesterone level and progesterone has the capacity to change the surface properties of cornea [22].

CONCLUSION

This study concluded that there is no definite relationship between postmenopause and intraocular pressure as the variation occurred in the values of IOP was statistically insignificant. But there are also some studies that have opinions about the definite relationship between postmenopausal stage and IOP. Some studies showed that increase in IOP during postmenopausal age.

Some of the recent studies showed the HRT in old women have a role in altering IOP by changing progesterone level. Normally old age people are more prone for change in IOP especially in female. Because in females many hormonal changes occur during post menopausal stage which may have influence on IOP. In this present study, hormonal assay was not done. Also the value of IOP was not measured on premenopausal periods and diseased conditioned subjects. It would be prudent to do this study on a larger scale with more subjects.

Others reported that an increase in body mass index (BMI) in postmenopausal women may play a greater role than hormonal changes. Menopause-related hormonal changes can lead to weight gain.

We conclude therefore that in this population, obese postmenopausalwomen may not have any direct effect on intraocular pressure. Intraocular pressure is negatively correlated in postmenopausal women.

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A Comparative Study of Amplitude of Nerve Impulse and Conduction Velocity of Median and Common Peroneal Nerve among Medical Students with or without Family History of Diabetes

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ABSTRACT

Object: True prevalence of diabetic neuropathy is not known, as it can develop even before the onset of clinically diagnosable diabetes mellitus because some individual may possess genetic attributes that affect predisposition to develop such complications. Nerve conduction changes are among the earliest evidence of DPN and are therefore a biomarker for subclinical neuropathy[15]. Due to their objective and quantitative character, they also are the most useful parameters for evaluating disease progression[3].

Method: Thirty healthy medical students as control and thirty non diabetic medical students having first degree diabetic relatives as test undergone included and excluded by doing FBS and OGTT. These groups were subjected to Median MNCV, Median SNCV and Common peroneal MNCV test. The data included in analysis are Amplitude and Conduction Velocity.

Result: The amplitude of Median Motor (Right hand/Left hand) students having family history diabetes was found to 8.86 ± (6.20) mV / 8.54 ± (5.70) mV *although its normal but its significantly low than* healthy students 18.13 ± (7.95) mV / 16.92 ± (18.04) mV respectively. Similarly amplitude of Common Peroneal Nerve (Right Leg/Left Leg) 3.61 ± (2.20) mV / 3.42 ± (2.77) mV which is less than normal range. The CV of Median Nerve right hand found to be 58 m/s which is above normal range but less than the healthy subjects. Whereas CV of Common Peroneal Nerve found to be within normal limits in both the cases.

Conclusion: Now it's evident that neuropathy can occur with impaired glucose tolerance and with metabolic syndrome in the absence of hyperglycemia[37,38].

Keywords: *CV – Conduction Velocity, DPN – Diabetic Peripheral Neuropathy, DN – Diabetic Neuropathy, NCS – Nerve Conduction Study, MNCV – Motor Nerve Conduction Velocity, SNCV – Sensory Nerve Conduction Velocity*

INTRODUCTION

Diabetic neuropathy is recognized by "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes" [5,6,7,34] .The risk of developing diabetic neuropathy is proportional to both the magnitude and duration of hyperglycemia , but some individuals may possess genetic attributes that affect their predisposition to develop such complications[5]. Lack of symptoms with first degree relatives does not rule out the presence of neuropathy[7,13,24]. Nerve conduction studies are the most objective, accurate, and reliable method for detecting diabetic peripheral neuropathy (DPN)[6,16,27]

AIM & OBJECTIVE

The present study was undertaken to assess DN as true prevalence is not known and depends on criteria and methods to define neuropathy as it can develop even before the onset of clinically diagnosable diabetes mellitus[15,31]. Present pilot study was undertaken to find out the utility of NCS

as an early indicator of neuropathy among medical students having family history of diabetes.

MATERIALS & METHOD

The study was conducted on an outpatient basis solely at the Department of Physiology, V.S.S. Medical College & Hospital, Burla, ethically approved by the Veer Surendra Sai Institutional Research & Ethics Committee (IEC/IRB - 06/15).

Three hundred medical students of age group 19-24 years were screened by questioner method which includes specific questionnaire, so that they can be excluded from normal.

Sixty medical students which include 30 control and 30 test, were included in this study after explaining the procedure of NCS and taking written consent.

Control group constitutes 30 healthy medical students neither had family history of diabetes nor signs and symptoms of neurologic abnormalities of extremities in their history and physical examination and their fasting and OGTT was found to be normal.

Test group consists of 30 non diabetic healthy medical students having first degree diabetic relatives already been diagnosed having neuropathic features or paraesthesia like numbness of finger, tingling, buzzing or pricking sensations of feet and hand at night. Thirty test non diabetic medical students screened for diabetes by fasting blood glucose and OGTT by GOD-POD method in the department of Biochemistry V.S.S. Medical College, Burla

SPECIFIC NERVE CONDUCTION TECHNIQUES

a. A normal room temperature (mean: 25^{0}C) and skin temperature of over 31^{0}C (32-34^{0}C)[24] maintained.

b. Median motor nerve conduction study performed by placing active surface electrode over the APB muscle, with stimulation at the wrist and elbow and ground electrode in between the stimulating and active electrode by using conducting jelly and adhesive pads.

c. Median antidromic sensory study performed by placing ring electrode over index finger and response recorded over median nerve and ground electrode placed in between stimulating and recording electrode by using conductive jelly and adhesive pads.

d. Common peroneal nerve active electrode placed over the digitorum brevis and reference surface electrode over the base of little toe ground electrode placed in between stimulating and recording electrode by using adhesive conductive pads.

e. Physiological parameters includes amplitude and conduction velocity of Nerve impulse of Median motor Median sensory and Common Peroneal nerve was record was maintained as per the guideline American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM)[2,4,16,18,19,20,21]. Neurostim – NS2 Medicaid System was used for this study.

INCLUSION CRITERIA

i. Medical students having First Degree Diabetic relatives.

ii. Students having Impaired glucose tolerance test

iii. Symptoms of paraesthesia like numbness of finger, tingling, buzzing or pricking sensations of feet and hand at night.

EXCLUSION CRITERIA

i. Diabetics

ii. Alcoholics

iii. Thyroid Abnormalities

iv. Any Chronic disease

DATA ANALYSIS

This study is cross sectional type of study and data distribution was in parametric. Statistics were generated by parametric test, obtained by paired t-test. Mean and SDs for continuous variables, correlation and significance were compared by paired t-test, using spss-17 statistics software.
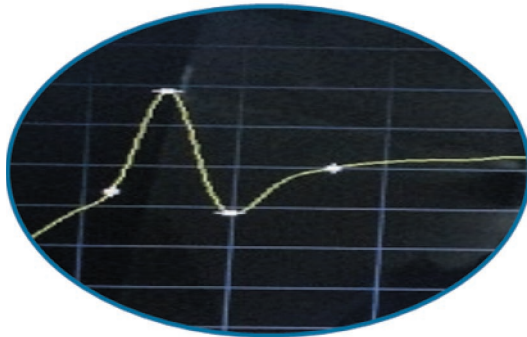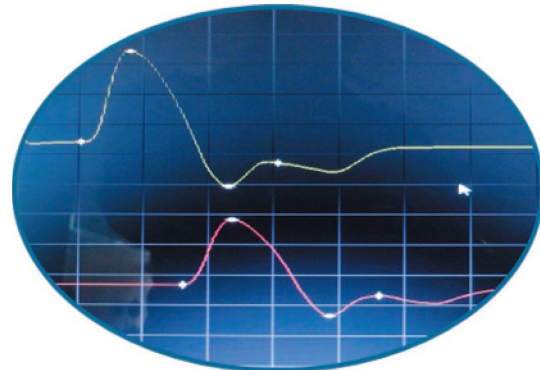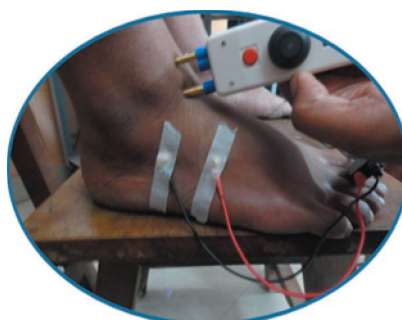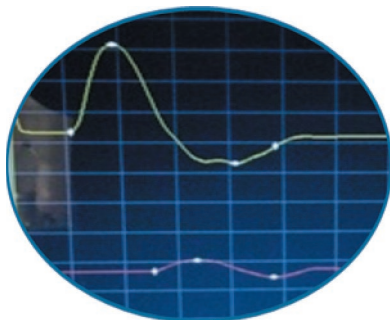
Ring electrode
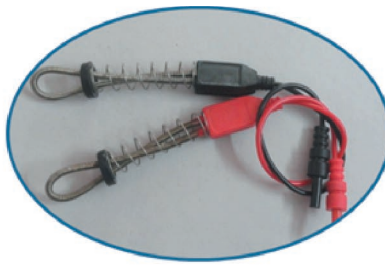
Ground electrode

Surface electrode

Median Sensory nerve Action potential and Recording

Median Motor nerve action potential and recording at wrist

Common peroneal nerve action potential at ankle joint and tibiofibular joint

RESULTS

In the present study the amplitude of Median Motor (Right hand/Left hand) students having family history diabetes was found to 8.86 ± (6.20) mV / 8.54 ± (5.70) mV *although its normal but its significantly low than* healthy students 18.13 ± (7.95) mV / 16.92 ± (18.04) mV respectively. Similarly amplitude of Common Peroneal Nerve (Right Leg/Left Leg) 3.61 ± (2.20) mV / 3.42 ± (2.77) mV which is less than normal range. The CV of Median Nerve right hand was found to be 58 m/s which is above normal range but less than the

healthy subjects. Whereas CV of Common Peroneal Nerve found to be within normal limits in both the cases. The amplitude and CV of Median Sensory was found to be normal in both the cases.

Table No - 1.

Parameters		Family history of Diabetes (30)		Significance Within the group Paired t-test	No family history of Diabetes (30)		Significance Within the group Paired t-test	Paired t-test Right FHD to Right Healthy / Left FHD to Left Healthy
		Right	Left		Right	Left		
Median Motor Nerve	*Amplitude* (mV)	8.86 ± (6.20)	8.54 ± (5.70)	p<0.766	18.13 ± (7.95)	16.92 ± (18.04)	p<0.779	p<0.000/p<0.018
	Conduction velocity (m/s)	58.20 ± (6.60)	63.23 ± (12.48)	p<0.066	65.41 ± (7.39)	61.68 ± (10.78)	p<0.019	p<.004/p<0.628
Median Sensory Nerve	*Amplitude* (μV)	74.05 ± (27.08)	78.24 ± (23.63)	p<0.332	75.25 ± (15.03)	88.71 ± (13.26)	p<0.000	p<0.826/p<0.033
	Conduction velocity (m/s)	73.46 ± (9.07)	72.87 ± (10.38)	p<0.791	70.62 ± (6.16)	68.54 ± (9.24)	p<0.222	p<0.157/p<0.057
Common Peroneal Nerve	*Amplitude* (mV)	3.61 ± (2.20)	3.42 ± (2.77)	p<0.730	6.05 ± (3.92)	7.21 ± (2.70)	p<0.120	p<0.001/p<0.000
	Conduction velocity (m/s)	51.69 ± (10.12)	48.73 ± (7.97)	p<0.186	49.71 ± (4.80)	49.25 ± (9.71)	p<0.764	p<0.357/p<0.823

Table No.1 represents mean value and SDs of *Amplitude* and *NCV* of *Median Motor Nerve, Median Sensory Nerve and Common Peroneal Nerve*. FHD – family history of diabetes, m/s – meters/second, mV – milliVolt, μV – microvolt, SD – Standard deviation, $p < 0.05$ taken as highly significant.

DISCUSSION

The NCS study of healthy individual, the amplitude and conduction velocity of Median Motor nerve is more than 4.4mV and 49m/s and for Median Sensory Nerve it's more than 20μV and 52 m/s. Similarly for Common Peroneal Nerve amplitude and CV it's more than 5.0 mV and 42 m/s respectively[1,8,9,17,22,23,24,29,30,34,35,36].

Criteria defining a neuropathy as demyelinating required three out of four of the following abnormalities affecting two or more nerves[2,4,12,26,32].

- Reduction in motor velocity to 80<percent of the lower limit of normal , e.g.<39m/s for arm nerves and <34m/s for leg nerves;

- Prolonged distal motor latencies exceeding >125percent of the upper limit of normal;

- Prolonged F wave latencies .125 percent of the upper limit of normal;

- Partial conduction block of >20percent or abnormal temporal dispersion causing >15percent change in duration not attributable to entrapment neuropathy.

Such criteria, whilst useful in established disease, are not met early in course of mild forms of chronic idiopathic demyelinating neuropathy. Most demyelinating neuropathies also involve sensory fiber with reduced amplitude or absence nerve action potentials.

Diabetic neuropathy is a set of clinical syndromes that affect distinct regions of the nervous system, singly or combined. Clinical signs and symptoms can

be nonspecific and insidious, and progression can be slow. Neuropathy can be silent and go undetected while exercising its ravages, or it can manifest with clinical symptoms and signs that mimic those seen in Diabetes. Therefore, it should be diagnosed by exclusion[14,20,21].

The commonest abnormality in diabetes is reduction in action potentials because of axonopathy. Pronounced slowing of NCV suggests demyelinating neuropathy should prompt investigations for alternative diagnosis. The NCV is gradually diminished in DN, with estimates of loss of about 0.5 m/s/y. A decrease in sensory and motor amplitudes, indicating axonal destruction, is more pronounced than the slowing of NCVs[25,26,33].

Present NCS shows there is decrease in amplitude of Median Motor and Common Peroneal Nerve which can be used for early detection of neuropathy in medical students having first degree diabetic relatives. Since some individuals may possess genetic attributes that affect their predisposition to develop such complications[5]. Relevant literatures pertaining to the subject have been reviewed, but nothing is known about the NCS study report of subjects having family history of first degree diabetic relatives. Furthermore, it is now evident that neuropathy can occur with impaired glucose tolerance and with metabolic syndrome in the absence of hyperglycemia[37,38].

In the light of the strong evidence linking early development of neuropathy in medical students even in the absence of hyperglycemia having first degree diabetic relatives requires further invasive neuromorphological studies, like nerve biopsy and skin biopsy to comment and to hold the significance of DPN.

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Problem Solving Counseling is One of the Best Tools for Stress Reduction in Medical Students

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ABSTRACT

Objective: In developing countries like India the academic pressure makes as potential stressors for first year medical students and is initiated with thought of failure, aiming for good grade and uncertainty about own capabilities. The present study has been planned to examine the effect of problem solving counseling on anxiety, stress and empathy for students from medical college of Uttar Pradesh.

Method: One hundred seventy eight undergraduate medical and non medical students were randomly selected for the study. The study subjects were fresh medical students and controls were age matched non medical students. The problem-solving counseling was given in study subjects; no counseling was intervened in the control group.

Results: After counseling the HR, SBP and DBP significantly ($P < 0.05$) reduced in study subjects. No significant changes were observed in PR interval, QRS duration and QTc interval. **Conclusion:** a substantial proportion of freshly entered medical students, in our medical college, are under the stress and anxiety. Strong actions should be taken to encourage medical students to seek help for psychosocial, academic and financial problems and to provide adequate facilities.

Keywords: Stress, Medical Student, Problem Solving Counseling.

INTRODUCTION

Stress may be defined as any situation which tends to disturb the equilibrium between a living organism and its environment[1]. Stress can create positive and negative influence; as a positive influence it can compel us to perform and as a negative influence leads to feeling of distress, anxiety and depression[2]. It is reported by various authors [3-5] that the stress in fresh medical students is fairly high and it may augments state of anxiety, depression and even the suicidal thoughts. This negative effect of emotional stress causes impairment of functioning in exams and affects the academic performances in day to day activities. It is also considerable that life without challenges or pressure or stress would be under stimulating and unexciting, so some amount of stress

is necessary to perform at their best. Various stressors have been reported for fresh medical students include moving to new environment, academic pressure, and peer issues, social and financial problem. In many countries including India, medical students are plagued by financial worries, which is an important cause of their stress [6-8]. In developing countries like India the academic pressure makes as potential stressors for first year medical students and is initiated with thought of failure, aiming for good grade and uncertainty about own capabilities[9]. The reason for the high number of existing stress syndromes is may be due to insufficient teaching, or rather learning, of strategies for dealing with the day-to-day stressors. Medical students with active coping strategies basically deal with these difficulties more successfully. Stress can be reduced by managing the emotions through mindfulness, experience of meditation techniques and communication[10, 11.] Even self-hypnosis, as a further relaxation technique, reduced the sense of distress among medical students

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and promoted positive effects [12]. Observation of students in different subjects revealed a positive impact of progressive muscle relaxation on anxiety and quality of life of those practicing the technique [13]. Relaxation and stress management techniques thus provide satisfactory alleviation of the massive mental stress encountered during medical education and decrease the risks of burnout, depersonalization, anxiety and stress among medical students[14]. The purpose of this study was to examine the effect of problem solving counseling on anxiety, stress and empathy for students from medical college of Uttar Pradesh.

MATERIAL & METHOD

Participants

The present study was undertaken at S N Medical College, Agra India and was approved by institutional ethics and review committee. One hundred seventy eight undergraduate medical and non medical students were randomly selected for the study. Out of 178 subjects 118 (85 male and 33 female) were study subjects and 60 (40 male and 20 female) were controls. The study subjects were fresh medical students and controls were age matched non medical students. The three basic science subjects (Anatomy, Physiology and Biochemistry) are taught during first year of MBBS course in a lecture-tutorial and practical basis manner.

Procedures

In the present study, the following information was collected from the participants: 1. Personal data: it included general information regarding the stay in a hostel, the medium of study in previous school or colleges, socioeconomic history and field of interest.

Problem-solving counseling: The term problem-solving is used in many disciplines, sometimes with different perspectives, but problem solving counseling a novel technique for stress reduction in medical students of first semester. In psychology problem solving refers to a state of problem abolition, and provokes the desire for reaching to the target [15]. This is the principle of stress reduction in the medical students. Problem solving is considered the most complex of all intellectual functions; problem solving has been defined as a higher-order cognitive process that requires the modulation and control of more routine or fundamental skills. Stressor or problems in first year medical students are identifiable and can be solved to a maximum extent. Basic problem that induces the stress in medical students includes how to cross the professional exam, unable to control the language problem, economic problem and social equilibrium among colleague. Following strategies were applied to solve the problems:

1. Identification of major problems

2. Re-nominate the problems in form of difficulties.

3. Creation of more than three modules of solution/ideas and combining and developing them until an optimum solution is found for every difficulty.

4. Be firm to work on decided target

5. Set the examples of previous successful events

6. Estimating the progress at close intervals.

General History and Examination:

A detailed history (height, weight, age, sex, date of birth, socioeconomic status, extra- curricular activities, hobbies and academic performance) was taken and clinical examination of all the participants was done. The problem-solving counseling was given in study subjects; no counseling was intervened in the control group.

Measurement of hemodynamic parameters as predictor of stress:

Systolic and diastolic blood pressure was measured by sphygmomanometer, heart rate and respiratory rate was recorded on student's physiograph. Electrocardiogram (ECG) was recorded on ECG machine with automatic reporting system[15]. All the data were recorded at the start of study and after three weeks of counseling.

OBSERVATION AND RESULTS

The increased heart rate (HR) and blood pressure as a predictor of hyper sympathetic activity, hence the stress, was recorded in study group. Our observation revealed that there was significant ($p < 0.05$) difference between basal heart rate of study subjects (86.5 ±7.63bpm) and basal heart rate of controls (75.25±5.30bpm). It was also observed that

the heart rate was more in female study subjects. Our data suggests that the basal systolic blood pressure (SBP) in control subjects was (116.8±4.10 mm Hg) and in study subjects it was 126.50±6.20 mm of Hg. Systolic blood pressure was higher in study subjects than control. Diastolic blood pressure (DBP) (mm Hg) was also recorded to be high in study subjects but it was not statistically significant (75.25 ± 4.86 vs 81.20±3.50). Although the respiratory rate was high in study subjects but it was not significant. No significant changes were observed in PR interval, QRS duration and QTc interval. (Data not shown) After counseling the HR, SBP and DBP significantly (P< 0.05) reduced in study subjects. (Table -1)

DISCUSSION

The present study has been planned to examine the effect of problem solving counseling on anxiety, stress and empathy for students from medical college of Uttar Pradesh. The hemodynamic parameters including HR, SBP, DBP and respiratory rate has been taken as stress and anxiety marker [16] in this study. Several studies have reported that fresh medical students suffer from various types of stress and anxiety during initial phase of learning. In this study, 52 % of the students had increased hemodynamic parameters which are quite high in comparison to other studies [17]. Problem solving counseling is pioneer technique in its kind to reduce the stress in medical students. This technique is based on solving the problem in real and evidenced means. Other techniques reduce the stress virtually, and do not reactivate the altered physiological processes. Now it became obvious that preventive programming efforts from medical college authorities should begin at the day of admission in the curriculum of medical education and address a wide variety of concerns from academic to interpersonal relationships and financial worries. Early signs of depressive symptoms among medical students should be addressed.

In conclusion, we firmly say that a substantial proportion of freshly entered medical students, in our medical college, are under the stress and anxiety. Strong actions should be taken to encourage medical students to seek help for psychosocial, academic and financial problems and to provide adequate facilities. Interventions in form of counseling to medical students might be directed towards those revealing depressive symptoms already present in first year of medical school. Individual as well as organizational interventions should be targeted to prevent excessive stress and burnout among medical students. Our problem solving counseling may be the best tool for stress reduction in medical students.

Table-1: Effect of problem solving counseling on hemodynamic parameters

Parameters		Control subjects	Study subjects
Baseline	**HR (bpm)**	75.25±4.30	86.50±4.63 *
	SBP (mm hg)	116.80 ±4.10	126.0 ±6.20 *
	DBP (mm hg)	75.25 ±4.86	81.20 ±3.50
	RR (breath/ min)	14.80 ±2.20	15.20 ±3.60
After 3 weeks	**HR (bpm)**	76.35 ±4.80	75.80 ±4.50 **
	SBP (mm hg)	115.70 ±8.20	118.20 ±5.20 **
	DBP (mm hg)	74.80 ±4.60	72.80 ±4.60
	RR (breath/ min)	14.30 ±1.60	14.7 ±1.80

HR: Heart rate; SBP: Systolic blood pressure; DBP: Diastolic blood pressure;

RR: Respiratory rate; * p value <0.05 Control vs Study subjects; ** p value < 0.05 Baseline vs after counseling

Ethical Clearance: Present study was approved by institutional ethics and review committee, SN Medical College, Agra UP India.

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