INTERNATIONAL JOURNAL OF PHYSIOLOGY

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International Journal of Physiology

International Journal of Physiology

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Volume 7, Number 1   **January-March 2019**

Study of Serum Calcium Levels in Premenopausal and Postmenopausal Women

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ABSTRACT

 Background: Menopause is the permanent cessation of menstruation seen in women between 40-61 years of age. Menopause is characterised by reduction in ovarian hormone production. Oestrogen deficiency and age related processes cause decrease in calcium levels in post menopausal women.

 Aims and Objectives: To study serum calcium levels in premenopausal and post menopausal women.

Materials and Method: Cross sectional study was conducted. 35 pre menopausal and 30 post menopausal women were selected according to inclusion and exclusion criteria . Patients with medical history of major systemic diseases, women on hormone replacement therapy, and women who had surgical menopause were not included in the study .Serum calcium levels were estimated in both groups. For statistical analysis the value of laboratory parameters were presented as the Mean±SD (standard deviation). A Student's t-test was used for cross-sectional comparisons of continuous variables between the groups.

Results: Serum calcium levels were significantly lower in post menopausal women than in pre menopausal women.

Conclusion: Post menopausal women are calcium deficient.

 Keywords: Premenopausal women, postmenopausal women, Menopause, serum calcium.

INTRODUCTION

Menopause is permanent cessation of menstruation, seen in women between 40-61 years of age. It is characterised by the menstrual changes that reflect oocyte depletion and subsequent reduction in ovarian hormone production. Menopause typically occurs in middle age, 40-61 years of age, signalling the end of the fertile phases of life[1]. Menopause is characterised by hot flushes, night sweats and various other psychological and biochemical changes . It also leads to metabolic bone disorders .With the onset of menopause, rapid bone loss occurs which is believed to average 2 to 3 % over the following 5 to 10 years, being greatest in the early post menopausal years [2,3]. Calcium ion is an essential structural component of skeleton. Body cannot synthesize it. Nutrition imbalance with endocrine abnormalities may be involved in osteoporosis[4.] Extracellular calcium ion concentration is determined by the interaction of calcium   absorption from intestine, renal excretion of calcium and bone uptake and release of calcium , each of which is regulated by parathormone, vitamin D and calcitonin[5]. Estrogen deficiency is present in post menopausal women. Estrogen deficiency results in longer life span of osteoclasts[6].This estrogen deficiency is reason for

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osteoporosis seen after menopause. The female sex hormone diminish to almost none after menopause .Bone turnover increases to high levels in women soon after menopause . The 2 main causes of bone loss are estrogen deficiency after menopause and age related process[7]. Intestinal calcium absorption decreases in post menopausal women[8] .Osteoporosis is a late complication of menopause.It is a degenerative bone disorder where there is thinning and weakening of the bone and a general decrease in bone mass and density. So susceptible to fractures .Fractures related to osteoporosis are estimated to affect around 30% of women in developed countries and are a major health problem.Normally bone will go through a process where old bone is replaced by new bone cells .Our body's ability to handle this process changes with age. Estrogen is involved in the process of calcium absorption into the bones. During menopause there is a drop in estrogen levels. All women will experience acceleration in bone density reduction as their estrogen levels drop. Menopause in elderly women is associated with accelerated loss of cortical bone .Rapid bone loss occurs when the balance between formation and resorption is upset resulting in a negative remodelling balance and leads to osteoporosis. It is mainly due to imbalance in hormonal factors like estrogen, prolactin and changes in bone formation markers like calcium, phosphorus. The decrease in the level of sex steroid hormones during menopause in women causes various somatic, vasomotor, sexual and psychological symptom. The risk of osteoporosis, cardiovascular disease, arterial hypertension, impairment of glucose metabolism, and degenerative cognition disease incidence rises. The impact of deficiency of female sex hormones after menopause on the trace minerals has not been widely studied but expected menopause related changes in their status may have an impact on the above pathologies. There are very few reports on the changes in serum calcium and magnesium levels in various phases of the menstrual cycle in otherwise healthy women. Estrogen induces hypercalcemia through the action of the parathyroid gland. Withdrawal of estrogen is reported to cause a significant loss of bone calcium. Increase in serum calcium levels during the follicular and ovulatory phases could be due to the effect of estrogen on the parathyroid glands. In addition to bone calcium content the level of serum calcium appears to be associated with blood pressure, and could be a metabolic risk factor for cardiovascular disease. The study was carried out to evaluate calcium status in pre and post menopausal women.

MATERIALS AND METHOD

Cross sectional study was conducted in 35 pre menopausal women (25-45 years of age) and 30 post menopausal women(46-65 years of age) in department of Physiology. Subjects were selected from general population according to the inclusion criteria . Consent was taken from subjects and procedure was explained to subjects.

Inclusion criteria   : Post menopausal women between age 46-65 years.

Exclusion criteria : 1) Surgical menopause due to hysterectomy

2) Post menopausal women on estrogen therapy

3) Women having Diabetes / Hypertension.

Collection of blood sample 5 ml of venous blood was drawn aseptically from each subject . It was centrifuged at 3000rpm for 10 minutes and serum was separated .Serum calcium levels were estimated by photocolorimetry method.

Statistics

Student t test was applied to see the significance of difference of parameters between 2 groups .Mean and standard deviation of variables was determined Correlation was done by using Pearson s correlation coefficient. The interpretation of P value are as follow

P >0.05 - not significant

P <0.05 - significant

P <0.01 - highly significant.

FINDINGS

The table shows that age of pre menopausal women was 36.73± 3.8 years (Mean± SD). Age of post menopausal women was 53.64±6.30 years (Mean± SD).

Serum calcium levels in post menopausal women were less as compared to premenopausal women and this was statistically significant(P=0.037). It is observed that serum calcium levels are low in post menopausal as compared to pre menopausal women.

Table : Serum calcium levels in pre-menopausal and postmenopausal women

Parameter	Pre menopausal women n = 35	Post menopausal women n = 30	P value
Age(years)	36.73 ± 3.8 years	53.64 ± 6.30 years	----
Serum Calcium(mg/dl)	10..07 ± 0.66 (mg/dl/)	8.4 ± 0.076 (mg/dl)	0.037

DISCUSSION

Calcium ion is an essential structural component of the skeleton. Estrogen deficiency after menopause induces calcium loss by indirect effects on extra skeletal calcium homeostasis as well as decreased intestinal calcium absorption. When estrogen is deficient, there is an increase in the activation of new bone remodeling units. Both formation and resorption are altered with the result that resorption exceeds formation, producing a negative balance. Estrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation. The results of the present study indicated that the level of serum calcium declined significantly in post menopausal women.

In this study serum calcium was evaluated in premenopausal and postmenopausal women. Serum calcium was significantly lower in postmenopausal women as compared to premenopausal women. Lower calcium levels after menopause lead to osteoporosis. Osteoporosis is late complication of menopause. Osteoporosis causes thinning and weakening of bone and general decrease in bone mass and density. So menopausal women are susceptible to fractures. Fractures related to osteoporosis are estimated to affect around 30% of women both in developing and developed countries and are major health problem [9]. During menopause there is drop in estrogen levels which caused decreased calcium levels in postmenopausal women. All women will experience acceleration in bone density reduction as their estrogen levels drop. Thus serum calcium could be used as indicator of increased bone turnover , to enable early intervention so as to minimize fractures due to osteoporotic changes [10]. The variation of serum calcium with age is proposed to be explained by alterations in levels of serum albumin to which approximately 40% of circulating calcium is bound and which was not adjusted for the study along with the modification of the resorption, excretion and reabsorption of calcium.

Studies have demonstrated that in addition to low estrogen levels, osteoporotic postmenopausal women had kidneys that did not reabsorb as much calcium as the kidneys of women without osteoporosis. Comparable to few other study series our study also had significantly reduced serum calcium in the postmenopausal group when compared to the premenopausal group

CONCLUSION

Serum calcium levels are decreased in postmenopausal women. The similar results have been found in many other studies[11-15]. We have used cross-sectional analyses to compare postmenopausal women with premenopausal women. Although cross-sectional investigations may provide clues regarding the effects of the menopause on the physiological and biochemical changes, confounding factors such as age, ethnicity, average energy intake, physical activity, serum albumin levels etc., have to be adjusted for statistical procedures to find out the changes in the variables independent of these factors. The present study revealed that the differences between the mean values and standard deviations of the variables in the premenopausal and postmenopausal groups were small; thus making large samples necessary to detect these differences. Our premenopausal group included few perimenopausal subjects also. Thus in order to establish standard reference values and formulate predictive equations, a representation of the whole population needs to be studied. Further large scale multicentric and longitudinal studies are required to further determine the actual changes in BMI, serum levels of magnesium and calcium, and correlation or independent association between them for their clinical implications in various disorders with transition of age, and passage of menopause which is inevitable in every woman's life. It can be recommended that calcium supplementation can be given as prophylaxis to prevent the long term bone loss and to decrease the risk of fracture and osteoporosis in postmenopausal women .

Conflicts of Interest: There are no conflicts of interest.

Source of Funding : Self funded.

Ethical Clearance: Done

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Study of Relationship between Body Mass Index and Physical Fitness in Adult Male Basketball Players

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ABSTRACT

Objective :To Study the relationship between body mass index and Physical fitness

Method :Healthy young male adults in the age group of 18-22 years were selected. Sample size was 50. Heart rate recovery and Handgrip strength test (HST) were recorded at rest and after isometric handgrip test.

Correlation was caculated using Pearson's Correlation test

Results: BMI was inversely correlated with measures of anaerobic power and muscle strength. (r= -0.51 with P<0.01)

Conclusion :There is negative effect of elevated BMI on selected parameters of physical fitness and sport performance Therfore achievement of optimal body mass should be considered by fitness trainers as means of physical fitness amelioration.

Keywords:BMI,Physical fitness,Heart Rate ,Hand grip dynamometer.

INTRODUCTION

Optimal weight is the important concern in day today life. Body mass Index is easy to calculate and helps to monitor the weight status.[2]Heart rate Recovery is heart's ability to return to normal level after physical activity.Fitness level and proper function of heart are measured by recovery phase.There is evidence that raised BMI is associated with reduced physical fitness[3]. The comparision between groups with different BMI revealed that groups with lower BMI have better physical fitness. Normal BMI is 18.5-24.9 kg/ m^2 and that of overweight subjects is 25-29.9 kg/ m^2.

AIMS AND OBJECTIVE

To Study the relationship between body mass index and Physical fitness

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MATERIALS AND METHOD

This is a comparative study which includes participants adult male basketball players in the age group of 18-22 years **.**Sample size is 50 in number. The study was carried out after obtaining an ethical clearance from ethical committee of our institution .

Materials :

Hand grip dyanmometer , electronic weight scale

Parameters

Study was carried out in physiology department

- Weight in kilogram. &height in meters were measured. BMI=Weight in kg/height in meter[2] was calculated to group them as normal weight.

- Waist to hip ratio was measured.

- Maximum voluntary contractions(MVC) was assessed and subjects were asked to carry out endurance isometric exercise at 40% of their

MVC

Study method –.

It is a prospective study.

Ethical clearance was obtained from institutional ethical committee. Prior to the procedure written and informed consent was obtained from all the subjects.

The exercise was performed in a well-ventilated room. Participants were instructed not to consume beverages nor a heavy meal in previous 4 hours or participate in any vigorous activities 24 hour before test.

At the reporting time subjects were asked to relax in supine position for 5min. Baseline HR was recorded. Isometric exercise was done using handgrip dynamometer.Subjects executed MVC contractions of 1second duration at 1 minute interval for 3times. Maximum of these is considered as their MVC .Then endurance contraction at 40% of their MVC is made. Isometric endurance contraction at 40% of the individuals MVC was executed with hand grip dynamometer.

Handgrip strength test :

The participants were asked to stand with their elbow bent approximately 90 degree and instructed to squeeze the handle of handgrip dynamometer as hard as possible foe 5 second.HST was calculated as sum of the best efforts for each hand divided by body mass and expressed as kg.kg^{-1} of body mass.

Heart rate was recorded at the end of test and in the end of first minute of recovery after the test.

Inclusion Criteria

- Young healthy adults male in the age group of 18-21yrs
- Non obese BMI 18.5– 24.9 kg/ m2 as control
- Overweight subjects is 25-29.9 kg/ m2 as test .
- Normotensive < 130/80mm Hg.
- Non smoker
- Non alcoholic
- Euglycemic

Exclusion criteria

- Use of any medication

- Smokers
- Alcoholic
- Any systemic illness

Written informed consent was obtained from the participants.All participants visited our laboratory and underwent a series of anthropometric and physiological measures .

Statistical methods

All the statistical methods were carried out through the SPSS for Windows (version 17.0).

- **Descriptives:** Data was expressed as Mean and Standard Deviation (SD).
- Students Independent –'t' test was employed to test differences in physical fitness between normal and overweight participants for each group.
- **Pearson correlation:** Pearson's correlation coefficients were estimated to determine the correlation between BMI and physical fitness

  p values < 0.05 are considered to be significant.

RESULTS

BMI was inversly correlated with measures of anaerobic power and muscle strength

Table 1: Comparision of BMI &WHR between normal and overweight

	NORMAL WEIGHT	OVERWEIGHT
Weight (Kg)	60.9±8.6	77.6±7.5
Height (m)	1.73±0.08	1.74±0.09
BMI (Kg/m2)	20.35±1.45*	25.98±1.76*
WHR	0.75±0.03*	0.80±0.04*

Data are mean±Standard Deviation

Table 2: Comparision of Heart rate recovery between normal and overweight

	NORMAL WEIGHT	OVERWEIGHT
HR recovery	95.8±18.4*	98.7±21.2*
HST Kg Kg -1	1.32±0.23*	1.10±0.23*

Data are mean±Standard Deviation

Table 3: Correlation of between BMI and physical fitness

	BMI	Physical fitness
HR recovery	0.07*	0.35*
HST	-0.52*	-0.75*

Correlation(Pearson co-efficient r) between BMI and physical fitness

*P<0.01

DISCUSSION

After exercise heart rate experiences abrupt drop during first minute.This recovery period can indicate fitness level and give an early warning of potential heart problems. The inverse association between BMI and mean power during handgrip muscle strength means higher the BMI lower the performance.Normal weight players had statistically significant superior performance compared to overweight counterparts.Excess of bodymass has a more negative effect on physiological characteristics[8] . Our findings came partially to terms with previous studies on general [1,5,6] and sport population. [7] Application of BMI in sport poulation showed reduced performance in overweight .Chen and colleagues [4] showed that normal weight male children had superior performance in cardiorespiratory endurance , in muscle strength and muscle endurance than their overweight counterparts.

CONCLUSION

There is negative effect of elevated BMI on selected parameters of physical fitness and sport performance Therfore achievement of optimal body mass should be considered by fitness trainers as mean of physical fitness amelioration.

Conflict of Interest: NIL

Ethical Clearance: Ethical clearance was obtained from the institutional ethical clearance committee.

Source of Funding: Self.

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Assessment of Wave V Hearing Threshold in Preterm Babies by Brainstem Evoked Response Audiometry

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ABSTRACT

Brainstem Evoked Response Audiometry (BERA), is considered as the most sensitive and specific test of hearing assessment in new-born and is beneficial for early detection of hearing impairment in preterm babies.

Background and Objective : BERA was recorded in preterm babies for determining the hearing threshold and to assess severity of hearing loss.

Material and Method : 50 preterm babies were selected on the basis of inclusion and exclusion criteria for the study. BERA was performed using RMS EMG EP MK II machine, wave V hearing threshold was determined and interpreted.

Result: Majority (52%) of the preterm babies in the study group were identified as having Mild grade hearing impairment (better ear hearing threshold between >26-40dB), 30% of the babies had Moderate grade hearing impairment (better ear hearing threshold between 41-60dB)

Conclusion: Screening by BERA at an early age in preterm babies is beneficial for early diagnosis of hearing impairment, so that possible early interventions can be implemented to prevent developmental delays in preterm babies.

Keywords: BERA, Hearing Impairment, Hearing threshold, Preterm.

INTRODUCTION

Hearing plays a vital role in development of speech, language and Intellect. It has long been recognized that unidentified hearing loss at birth can adversely affect speech and language development as well as academic achievement and social-emotional development of the child. Even if the child is partially hearing impaired he might develop psychological, social, educational and even cognitive problems[1].

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The ultimate goal of early screening of hearing impairment is to optimize communication, social, academic and vocational outcomes for each child with hearing loss must remain paramount for audiological habilitation.

Unfortunately, the average time between birth and the detection of congenital sensorineural (SN) hearing loss is 2.5 years[2], this may cause irreversible stunting of language development potential of a child.

Historically, moderate-to severe hearing loss in young children remained undetected until well beyond the newborn period, and milder hearing loss and unilateral hearing loss remained unnoticed until children reached school age. Early detection and intervention would help to maximize linguistic competence and

literary development of children who are deaf or hard of hearing. Consequently these children will fall behind their hearing peers in communication, cognition, reading, and social-emotional development. This delays may lead to lower educational and employment levels in adulthood.[2] The American Joint Committee on Infant Hearing recommended that audiological rehabilitation should begin within the first 6 months of life [3]. The only way of detecting hearing deficits at this age is by neonatal screening. Measurement of the auditory brain stem response (ABR) is considered the most sensitive method of assessing the auditory activity of neonates[2].

Preterm is defined as birth on or before the end of the last day of the 37th completed week after the onset of the mother's last menstrual period[4]. The number of preterm births has increased over the past decades as a result of increasing maternal age and in vitro fertilization[5]. At the same time the survival of preterm infants has increased due to advances in perinatal and neonatal care.

Unfortunately, these improvements sometimes come at a price. Neonatal intensive care unit (NICU) survivors have an increased risk of neurodevelopmental impairment, such as cerebral palsy, cognitive delay, blindness and deafness[6]. Infants admitted to the NICU have an increased risk of congenital and acquired hearing loss compared to infants admitted to the well-baby nursery[7]. Multiple risk factors have been associated with congenital hearing loss[8]. Many of these risk factors occur in daily NICU care.

Severe neurodevelopmental disability remains the worst adverse long-term outcome associated with prematurity. Advances in the field of medicine has resulted in increase in the survival rates of preterm infants. Preterm infants are more susceptible to Hypoxemic ischemic brain injury. The auditory sequelae are more frequently associated with increased survival of preterm births. Early diagnosis by screening can help limit the handicap resulting from deafness. The true value of screening lies in identification of mild to moderate hearing losses that are amenable to treatment and if untreated may manifest like a severe impairment.

Brainstem evoked response Audiometry (BERA) provides an opportunity to evaluate the functional integrity of auditory pathway from inner ear to upper brainstem.

Studies have shown that early intervention of babies with congenital hearing deficits minimizes future problems with language and speech development[9, 10]. Treatment before the age of six months results in better speech and language development at school age to adequately diagnose hearing loss, age-adjusted normal values for ABR measurement are required. This is a special challenge since maturation of the auditory system is still in full progress during the perinatal period. Also the course of hearing loss can change over time.

With this background in mind, the research study was planned to investigate the presence of hearing impairment in the preterm babies at high risk of developing auditory deficit and future outcomes by determining wave V hearing threshold and grading the severity of the impairment if any.

MATERIAL AND METHOD

The present study was conducted in the Neurophysiology Lab of Department of Physiology, Gandhi Medical College, Bhopal, in collaboration with the Department of Pediatrics, Gandhi Medical College, Bhopal. The study was approved by the ethical committee of Gandhi Medical College (Approval no. 10292-93/MC/7/2015). All the patients were referred to the Department of ENT of the institution for thorough ENT checkup and to exclude any ear pathology.

All the preterm babies hospitalized in NICU at Kamla Nehru Hospital, associated with Gandhi medical college, Bhopal from February 2015 to June 2015 were examined for sample selection.

Out of the 86 preterm babies examined, 50 preterm babies satisfying the inclusion and exclusion criteria and whose parents gave consent were included in the study, these study subjects were divided into three groups based on their gestational age as defined by New Ballard Score (Group 1- 32weeks, Group 2- 34weeks and Group 3- 36 weeks of gestation) and were subjected to BERA.

INCLUSION CRITERIA -

Gestational age <37 completed week.

Babies not having any other risk factor that may cause hearing impairment as defined by joint committee of infant hearing (JCIH)[11]

Babies not critically ill.

Whose parents gave consent to participate.

EXCLUSION CRITERIA -

Gestational age ≥37 completed weeks.

Babies critically ill.

Patients having risk factor/factors according to JCIH other than inclusion criteria.

Babies satisfying the inclusion and exclusion criteria were subjected to BERA test on RMS EMG EP MARK-II machine in the neurophysiology unit of department of Physiology, Gandhi medical college, Bhopal. Written consent was taken by the parents and the whole procedure was explained to them. Parents were instructed to wash the head of the baby thoroughly, not to apply any lotions or oils on head or forehead before the test, and to feed the baby adequately before the commencement of the test.

Drug used for sedation was syrup Triclofos (pedicloryl) as prescribed by the pediatrician. Test was carried out in pre–cooled, quiet, dimly lit room. Electrical activities were recorded using silver electrodes (Ag/AgCl).

The mono-aural montage, i.e. Cz-M1/M2 was used; Cz (Forehead at the hairline) =Reference electrode Fpz/Fz (Nasion) =Ground Electrode; M1/M2 (Mastoid) =Active or recording electrode. Conductive electrolyte paste was used to fix the electrodes. Resistance was kept below 5 Kohms. The stimulus in the form of click was transmitted to the ears via acoustically shielded THD 32 head phone.

Mono-aural auditory stimulus consisting of rarefaction clicks with intensities starting from 30 dB to 90 dB was delivered at a rate of 11.1/sec. Contralateral ear was masked with intensity 30 dB less than the stimulus intensity. The filter settings 100 Hz – 3000 Hz were used; 2000 responses were averaged and the process was repeated at least once to ensure reproducibility of the response. Wave V Hearing threshold for both ears were recorded and interpreted.

OBSERVATIONS AND RESULTS

Observed values were compared with the normal values and the severity of hearing impairment was graded as per the WHO guidelines.

GRADING OF SEVERITY OF HEARING IMPAIRMENT AS PER WHO GUIDELINES[12]

Severity of hearing impairment	Hearing threshold of better ear
Mild hearing impairment	26-40dB
Moderate hearing impairment	41-60dB
Severe hearing impairment	61-80dB
Profound hearing impairment	>80dB

TABLE 1- WAVE V HEARING THRESHOLD IN THE STUDY GROUP (MEAN±SD)

PARAMETER	GROUP 1 32 WEEK(N=12)		GROUP 2 34 WEEK(N=20)		GROUP 3 36 WEEK(N=18)	
	LEFT	RIGHT	LEFT	RIGHT	**LEFT**	**RIGHT**
HEARING THRESHOLD(dB) (MEAN±SD)	51.25±6.4	52.2±9.71	40±10.54	39.4±12.58	38.13±12.23	36.25±14.08

The recorded wave V hearing threshold denotes an increase with respect to the normal hearing threshold in term babies as per WHO guidelines, signifying hearing impairment.

TABLE 2- INTERGROUP COMPARISON OF HEARING THRESHOLD IN THE STUDY GROUP

	PARAMETER	Group 1 Vs. Group 2		Group 1 Vs. Group 3		Group 2 Vs. Group 3	
		T	p-value	T	p-value	T	p-value
LEFT EAR	**Hearing Threshold(dB)**	3.33	<0.005*	3.37	<0.005*	0.05	NS
RIGHT EAR	**Hearing Threshold(dB)**	3.01	<0.005*	3.41	<0.005*	0.72	NS

*statistically significant, NS- Not significant

Inter-group comparison of hearing threshold in all the three gestational age groups revealed significant increase in hearing threshold of both the ears in group 1 as compared to other two groups.

TABLE 3- DISTRIBUTION OF SEVERITY OF HEARING IMPAIRMENT IN STUDY GROUP (N=50):

GRADING OF HEARING IMPAIRMENT	PERCENTAGE OF BABIES(N=50)
Normal hearing sensitivity	14%
Mild hearing impairment	52%
Moderate hearing impairment	30%
Severe hearing impairment	00%
Profound hearing impairment	04%

An attempt was made to grade the hearing impairment in the study group as per the WHO guidelines.

It was observed that majority of the babies were having Mild grade Hearing impairment and two babies were identified as having profound grade Hearing impairment.

TABLE 4- GROUPWISE DISTRIBUTION OF SEVERITY OF HEARING IMPAIRMENT

GRADE	GROUP 1(N=12)	GROUP 2(N=20)	GROUP 3(N=18)
Normal hearing sensitivity	0(0%)	2(10%)	5(27.77%)
Mild hearing impairment	3(25%)	14(**70%**)	9(**50%**)
Moderate hearing impairment	8(**66.67%**)	4(20%)	3(16.67%)
Severe hearing impairment	0(0%)	0(0%)	0(%)
Profound hearing impairment	1(8.33%)	0(0%)	1(5.56%)

Majority of babies in group 2 and group 3 were identified as having Mild grade Hearing impairment. While in group 1 Moderate grade Hearing impairment was predominant.

DISCUSSION

The functional integrity of auditory system is the base for language and speech development. In preterm babies, impairment of central auditory system due to any risk factor present alters the afferent activity in the peripheral auditory system, leading to structural and functional changes in the developing brain. Preterm babies often have various perinatal complications that may impair the central nervous system leading to neurodevelopmental deficits.

The major goal of the present study was to detect any auditory impairment in preterm babies, particularly in those who have no other risk factor that may directly or indirectly affect the central auditory system.

The study comprised of 50 preterm babies. Preterm babies included in the study were categorized into three groups based on the gestational age. Group 1 with gestational age 32 weeks (n=12), Group 2 with gestational age 34 weeks (n=20) and Group 3 with gestational age 36 weeks (n=18).

Study aimed to assess the presence of hearing impairment in the preterm babies. Early diagnosis by screening can help limit the handicap resulting from hearing deficit.

As an objective test BERA was used to identify auditory impairment and to grade the severity.

Determination of hearing threshold is the mainstay of diagnosis of hearing impairment. Increased hearing threshold in neonates, is attributed to mechanical attenuation of sound in the middle and inner ear due to presence of embryonic fluid in the compartment, immaturity of basal part of basilar membrane and hair cell auditory synaptic function[13].Improper myelination of auditory nerve might be one of the causes.

In the present study 43 preterm babies were found to have increased hearing threshold (>26 dB in better ear).

Venkatesh LT et al (2015)[14], reported mean wave V threshold for 26 preterm babies at 49.94±21db which was highly significant, also they reported that no response was obtained in 4 babies in their study group.

Arora S et al (2003)[15],studied 29 premature babies, they reported increased hearing threshold (>30 dB) with increased absolute latencies in 13 ears of 7 neonates with gestational age of 30 weeks, 2 neonates at 32 weeks of gestation had threshold of >40 dB and 5 neonates with gestational age of 34 weeks had threshold above 40dB.

Salamy A et al (1984)[16] observed that neonates with greater hearing threshold showed, greater proportion of ABR abnormalities throughout infancy and early childhood.

So a raised BERA threshold is a sensitive indicator for further auditory investigation and necessary intervention.

In the present study, severity of hearing Impairment was graded as MILD (>26-40 dB), MODERATE (41-60 dB), SEVERE (61-80 dB) and PROFOUND (>80 dB) as per the WHO guidelines[12].

On this basis an attempt was made to grade the severity of hearing impairment. Majority (52%) of the preterm babies in the study group were found to have Mild hearing impairment, 30% of the preterm babies had moderate hearing impairment and 2 preterm babies in the study group were found to have Profound hearing impairment.(Table 3)

Group wise distribution (Table 4) of hearing impairment revealed that, in Group 1(32 weeks gestational age), 25% of the babies had mild grade hearing impairment. Moderate grade hearing impairment was predominant in this group 1 with about 66.7% babies having moderate hearing impairment, while 1 baby was found to have profound grade hearing impairment.

In Group 2 (34 weeks gestational age) and Group 3 (36 weeks gestational age), majority of the babies i.e. 70% and 50 % respectively had Mild grade hearing impairment, while moderate impairment was found in 20% and 16.7% of the babies respectively. 1 preterm baby in Group 3 had profound grade hearing impairment.

Bhagya V et al (2011)[17], studied incidence of hearing loss in infants at high risk and found that out of 25 preterm cases 7 had mild-moderate hearing impairment whereas 40% had severe hearing loss.

Fakhraee SH et al (2004)[18], assessed hearing impairment in high risk neonates with gestational age ranged between 26 to 38 weeks and reported that out of 108 patients; 42(28%) had mild to profound hearing impairment. Similar to our finding they reported mild hearing impairment to be the most common impairment with 17(11.3%) of the infants having mild impairment.

Valkama marita (2002)[19] reported that 6 out of 51 preterm infants (12%) had significant bilateral hearing loss (60-105 dB).

The observation of the present study revealed that majority of the preterm babies included in the study had significantly raised hearing threshold, suggesting presence of hearing impairment of various grades of severity (mild, moderate, severe and profound).

BERA findings also revealed that babies in Group 1 (32 weeks of gestation) were affected the most as compared to the babies in other two groups i.e. group 2 (34 weeks of gestation) and Group 3 (36 weeks of gestation), suggesting gradual maturational pattern of the auditory pathway.

Thus hearing assessment by BERA at an early age in preterm babies is beneficial and can reduce morbidity associated with hearing impairment.

CONCLUSION

It may be concluded that the babies that are "born too soon" needs special care and attention as they are most vulnerable to have various abnormalities.

The present study has shown that the preterm babies had altered BERA findings signifying hearing impairment.

BERA is thus a useful, non-invasive tool to detect any auditory impairment, to confirm the normal hearing sensitivity and to delineate the preterm babies with any hearing deficit. Early detection of auditory impairment before 3 months of age and interventions before 6 months of age may limit the effects of the deficit on speech, cognitive and social development of the babies and limit the handicap.

The hearing screening results should be communicated to the family and make them aware to understand the special needs of the baby for further investigations, intervention and audiological habilitation if needed.

Conflict of Interest- None

Mode of Funding- Self

Ethical Clearance - Taken from institutional ethical committee.

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Family History, BMI and Sympathetic Hyperactivity in Healthy Offsprings of Hypertensive Parents

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ABSTRACT

Objective: Hypertension is associated with large and growing health and economic burden of Cardiovascular and renal diseases. Hypertension doubles the risk of cardiovascular disease, including coronary heart disease(CHD), congestive heart failure, ischemic and hemorrhagic stroke , renal failure and peripheral arterial disease.

Recent study suggests prevalence of Hypertension is increasing as a consequence of increasing obesity. Both environmental and Genetic factors contribute to the increased prevalence of Hypertension. Obesity and weight gain are strong, independent risk factors for hypertension. Aim of this study was to assess relation between Family history, BMI and autonomic function tests in healthy offsprings of hypertensive parents.

Method: The present study was conducted in 35 normotensive healthy offsprings of Hypertensive parents (Study Group) and 35 normotensive healthy offsprings of Nonhypertensive parents (Control Group), in the age groupof 18-21 years, randomnly selected from 1st and 2nd MBBS Students of Shri.BM patil Medical College. Bijapur.

Results: There is also significant increase in sympathetic function tests and insignificant increase in the readings of parasympathetic function tests and significant increase in resting Respiratory rate and Resting Systolic Blood Pressure in study group compared to control group.

Conclusion: This cross sectional study showed increase in prevalence of cardiac autonomic dysfunction more of sympathetic overactivity in normotensive healthy offsprings of Hypertensive parents, compared to normotensive healthy offsprings of Nonhypertensive parents.

Keywords: Family History, BMI, autonomic function tests

INTRODUCTION

Hypertension is associated with a large and growing health and economic burden of Cardiovascular and renal diseases[1,2]. Hypertension doubles the risk of cardiovascular disease, including coronary heart disease(CHD), congestive heart failure, ischemic and hemorrhagic stroke , renal failure and peripheral arterial disease.

Recent study suggests that prevalence of Hypertension is increasing as a consequence of increasing obesity. Both environmental and Genetic factors contribute to the increased prevalence of Hypertension. Obesity and weight gain are strong, independent risk factors for hypertension. It has been estimated that 60% of hypertensives are >20% overweight[3]. About 30% of patients with primary hypertension have genetic predisposition[4]. The ANS maintains Cardiovascular homeostasis via pressure , volume and chemoreceptor signals[3]. In both normal weight and obese individuals, hypertension often is associated with increase in sympathetic outflow[3]. Aim of this study was to assess the relation between Family history, BMI and autonomic function tests in healthy offsprings of hypertensive parents.

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MATERIALS AND METHOD

The present study was conducted in 35 normotensive healthy offsprings of Hypertensive parents (Study Group) and 35 normotensive healthy offsprings of Nonhypertensive parents (Control Group), in the age groupof 18-21 years, randomnly selected from 1st and 2nd MBBS Students of Shri.BM patil Medical College. Bijapur.

Exclusion criteria:

Subject on any medication

History of Chronic disease.

Smokers

Subject with a history of tobacco and alcohol intake.

Any disease affecting autonomic Nervous System

Inclusion Criteria:

Only healthy subjects of Indian origin were included in the study. The subjects without the signs of Cardiovascular, Endocrinological, Neurological, Hematological and inflammatory diseases were selected for the study. Systolic BP (SBP) in the range of 90-139mm Hg, Diastolic BP(DBP) between 60-89 mmHg was considered for the study[2]. Informed Consent was taken from all the subjects in the study.

All the tests were done in morning hours to maintain uniformity among subjects.

STATISTICAL ANALYSIS: Statistical analysis was done by Students t test using SPSS software version 20.

p Value >0.05 is taken as not significant. p Value <0.05 is taken as significant.

p Value <0.01 is taken as highly significant. p Value <0.001 is taken as very highly significant.

Recording of Physical Anthropometry: Height (in cms), Weight (in kgs), Body Surface Area (Square meters)Dubois Nomogram, Body Mass Index (Kilogram/meter[2]) Recording of Physiological Parameters:Respiratory rate (cycles/minute), Heart rate (Beats/minute), Systolic and Diastolic blood pressure (mm of Hg) by using mercury sphygmomanometer.

Recording of Autonomic Function Parameters

The Cardiovascular Autonomic Nervous System Function Parameters are selected as recommended by American Diabetic Association and performed as per methods described by Sir Roger Bannister[5] and as prescribed by the criteria of Ewing and Clarke[6]

A) The Parasympathetic activity is assessed by:

Heart Rate response to Valsalva Maneuver

Heart rate response to deep breathing

Immediate heart rate response to standing (30:15 ratio):

B. The sympathetic activity is assessed by:

1. Blood pressure response to standing

2. Blood pressure response to sustained handgrip exercise.

Subjects were informed about the procedure.

The ECG recordings for these tests were performed on Computerized 4 channel Physiopac(Medicaid). Blood pressure (BP) was measured with the help of mercury sphygmomanometer (Diamond).

RESULTS

Results were tabulated and analysed using 't'test. *p value <0.05 was considered Significant

Table 1: Physical Anthropometric Parameters

Parameters	Control Group	Study Group	Level of significance
Age (Years)	18.26 ± 1.10	19.36 ± _0.58	0.323
Height (cms)	168.06± 4.94	170.53±6.01	0.04*
Weight (Kg)	67.2 ± 9.86	72.08 ± 10.91	0. 03*
BMI (kg/m^2)	23.12 ± 3.45	24.21 ± 3.03	0.11
BSA (Sq m)	1.74 ±0.13	1.81 ± 0.15	0. 01**

*p <0.05: Significant, ** p <0.01: Highly significant.

Table 2: Physiological Parameters.

Parameters	Control Group	Study Group	Level of significance
Resting PR(bpm)	78.8±6.31	77.86±5.75	0.279
Resting RR (cycles/min)	14.03±2.51	15.50±1.57	0.03*
Resting SBP(mm of Hg)	117.53±11.4	125.13±12.20	0.05*
Resting DBP (mm of Hg)	77.06±5.29	78.66±6.74	0.23

*p <0.05: Significant, ** p <0.01: Highly significant, *** p <0.001: Very highly significant

Table 3: Autonomic function test parameters

Autonomic function parameters	Control Group	Study Group	Level of significance
Valsalva Ratio	1.32 ± 0.20	1.28 ± 0.24	0.212
HR variation to deep breathing (Maximum-Minimum)	28.16 ± 7.24	26.12 ± 8.26	0.112
Immediate HR response to standing (30:15)	1.33 ± 0.68	1.30 ± 0.22	0.225
BP response to Standing (Fall in SBP)	5.66 ± 1.76	4.66 ± 2.33	0.012**
BP response to sustained Hand grip (Increase in DBP)	21.0 ± 3.95	18.4 ± 5.68	0.055*

*p <0.05: Significant, ** p <0.01: Highly significant, *** p <0.001: Very highly significant

DISCUSSION.

The present study was carried out in 70 healthy normotensive subjects (Offsprings of Hypertensive parents n=35, Offsprings of Nonhypertensive Parents n=35). In our study, we recored physical and physiological parameters in both control and study groups. Autonomic functions were assessed by Heart Rate response to Valsalva Maneuver, Heart rate response to deep breathing, Immediate heart rate response to standing (30:15 ratio): Blood pressure response to standing, Blood pressure response to sustained handgrip exercise.

Present study showed significant increase in Weight and height in study group Compared to control group. Our study is in accordance with studies done by Josiane M. Motta et al [7] Nafiu et al[8]

Present study also showed significant increase in resting Respiratory rate and Resting Systolic Blood Pressure in Study group compared to control group. Our study is in accordance with studies done by Schneider GM et al, Lopes HF et al [9,10]

There is also significant increase in sympathetic function tests and insignificant increase in the readings of parasympathetic function tests in study group compared to control group. Our study is in accordance with studies done by Rathi P et al [11], Matthews CF et al [12.]

CONCLUSION

This cross sectional study showed increase in prevalence of cardiac autonomic dysfunction more

of sympathetic overactivity in normotensive healthy offsprings of Hypertensive parents, compared to normotensive healthy offsprings of Nonhypertensive parents. These tests can be used as routine tests for earlier detection of hypertension in persons who have genetic predisposition. Health promoting lifestyle modifications like regular physical activity, healthy diet are recommended for individuals with prehypertension. Prevention and treatment of obesity are also important factors for reducing blood pressure and cardiovascular disease risk.

Ethical Clearance: The ethical clearance for the study was obtained from ethical committee.

Source of Funding: Self

Conflict of Interest: Nil

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Effect of Aerobic Exercise and Yoga on Heart Rate Variability (HRV) Parameters in Young Adults

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ABSTRACT

Analysis of beat-to-beat variability of heart rate(HR) has been stated to represent one of the promising quantitative markers of autonomic activity. Dysregulation of autonomic activity seen in life style associated disease is believed to be modified by physical activity. Present study was to evaluate and compare the autonomic activity in aerobic exercisers and yoga practitioners. Ninety healthy male subjects aged 30-40 years were included in the study. The study consisted of three group with 30 subjects in each. Group1: Subjects who practiced regular structured aerobic exercise for a period of minimum 6 months. Group 2: Subjects practiced yoga regularly for a period of minimum 6 months. Group 3: Healthy subjects (normal BMI) neither practiced yoga or any type of exercise regularly. Heart Rate and HRV were recorded in all subjects using standard procedures. The study showed decreased LF (Low Frequency) in Yoga group and exercise group than control group, also decreased HR, and LF/HF(Low frequency / High Frequency) ratio and increase HR in yoga group. This indicates that parasympathetic activity is substantially greater in yoga practitioners followed by athletes and control.

Keywords : Aerobic exercise, yoga, HRV.

INTRODUCTION

Lifestyle diseases are increasing, especially in developing countries at high rate. Advancement in the technology has led to physical inactivity, which has been majorly blamed for the rise in life style associated disorders which is indicated by disruption of autonomic balance and prolonged autonomic imbalance is associated with a wide range of somatic and mental diseases. The cardiovascular system is mostly controlled by autonomic regulation through the activity of sympathetic and parasympathetic pathways of the autonomic nervous system. Analysis of HRV permits insight in autonomic control mechanism[1]. Heart rate variability (HRV) has been used as a proxy for health and fitness and indicator of autonomic regulation. The three components found in HRV power spectrum: (a) a peak at respiratory frequency that corresponds to respiratory sinus arrhythmia (HF, > 0.15 Hz) ; (b) a peak centered at about 0.1 Hz that is related to arterial pressure control (LF 0.04-0.15 Hz); (c) a component at very low frequency (VLF, <0.04 Hz) considered to be expression of the peripheral vasomotor regulation[2]. Physical

exercise in general is reported to reduce the occurrence of cardiovascular diseases and possible complications arising out of them. Hence Physical activity is proved to be highly beneficial concerned with life style disorders. Exercise is considered as an acceptable method for improving & maintaining physical and emotional health. Although yoga is historically a spiritual discipline, a growing body of evidence supports the belief that yoga benefits physical & mental health. Hence, we propose to compare the effect of two types of physical activity i.e. aerobic exercise and yoga on HRV in young healthy subjects.

MATERIALS & METHOD

Ninety healthy male volunteers aged 30-40 yrs were selected for our cross sectional study. The mean height of subjects was 170±4cm (range 164-178 cm) and weight 68±6 kg (range 57-79 kg). The study included 3 groups having 30 subjects in each group. Group1(A): Subjects who practiced regular structured aerobic exercise for a period of minimum 6 months in sports schools of the city. Group 2(Y): Subjects practiced yoga regularly

for a period of minimum 6 months in various yoga schools. Group 3(C): Healthy subjects (normal BMI) neither practiced yoga or any type of exercise regularly. Subjects with history of hypertension, diabetes mellitus, any chronic illness were excluded from the study. The subjects were ascertained to be healthy after a thorough clinical examination. They were briefed about the study & informed consent was obtained. Institutional ethical committee approval was obtained.

Heart Rate and HRV were recorded in all subjects using standard procedures. Recordings were done for 5 to 6mins. as both 24-hour and brief, resting HRV have been linked to cardiovascular outcomes and a brief, resting HRV measurement of four to five minutes is sufficient[3] for the measures used in our study in sound attenuated room by Niviqure ambulatory system which is a computerized ECG recording system, that allows to acquire, analyze and store ECG data over long hours (Niviqure Meditech Systems, Bangalore, India) [4] On each subject ECG was recorded using disposable Ag/AgCl solid adhesive pre-gelled electrodes in standard lead II configuration. The ECG was acquired using an ambulatory ECG system (Niviqure) at the sampling rate of 1024 Hz and was stored on the hard disc of a PC (Pentium IV) for analysis. The R waves were detected to obtain a point event series of successive R-R intervals, from which the beat to beat heart series were computed. The data recorded was visually inspected off-line and noise free data were included for the analysis.

The variables were measured were, LF (Low frequency power of HRV spectrum), HF (High frequency power of HRV spectrum), LF/HF Ratio of low and high frequency powers, HR (b/min) .

HF reflects efferent vagal activity. LF is considered by some researchers to reflect both sympathetic and parasympathetic modulation while others consider it a measure of vagal withdrawal. The LF/HF ratio was calculated to assess the sympatho - vagal balance [5].

RESULTS

ANOVA analysis was done using SPSS version 19. The analysis of data was done by One way ANOVA and multiple comparision by Dunnett T3 test. HR and HRV on frequency domain includes HF (High frequency) component (0.15-0.4 Hz) and LF(Low frequency) component (0.04-0.15Hz). The study showed increased LF in control group followed by athletes and Yoga group, also decreased HR, HF and LF/HF ratio in yoga group.

Table No 1: Frequency domain parameters of HRV of all three groups (Mean ± SD)

Parameters	Group 1 (A)	Group 2 (Y)	Group 3 (C)	p value
HR(beats/min)	69.08± 8.89$	68.01±7.08*	72.53± 10.33	0.003
LF ms^2	512.35± 782.07$	369.05± 287.43* #	632.30± 624.18	0.001
HF ms^2	986.11± 1001.53$	1439.79± 1196.44* #	804.91±1009.84	0.001
LH/HF	1.88±1.50$	1.36± 0.97* #	2.20±1.94	0.001

note: significant p value <0.05 . significant Dunnett T3 P values shown as

*$p_1 \le 0.05$ yoga vs sedentary, #$p_2 \le 0.05$ yoga vs aerobic exercise $$p_3 \le 0.05$ aerobic exercise vs sedentary.

DISCUSSION

In the present study, the effect of long-term physical activity in terms of yoga and aerobic exercise was evaluated on cardiac autonomic function. Previous studies have shown no significant changes[5], significant decrease[6] as well as nonsignificant decrease[7] in HR after yoga practice . In our study HR in both group 1 & group 2 was significantly decreased compared to group 3 (control). Autonomic nervous system is known to have an effect by regulating HR[8], which is one of the mechanism that accounts for risk reduction & cardioprotective effect of Physical activity. Yoga shows more decrease in HR compared to aerobic exercise, reason can be attributed to different postures involved in yoga. Supine and inverted body postures stimulate the baroreceptor reflex (from altered negative pressure in the upper body) and may

create a parasympathetic (vagal) activity ,while upright postures inhibit it [9].

A significant decrease in LF was observed in Yoga & exercise group compared to control and significant decrease in yoga group compared with exercise. This may be attributed to inhibition of posterior or sympathetic area of the hypothalamus which optimizes the body's sympathetic responses to stressful stimuli. This helps restore autonomic regulatory reflex mechanisms associated with stress [10].

A significant increase in HF was observed in Yoga & exercise group compared to control and significant increase in yoga group compared with exercise group, similar to the finding in study by Peter done in different age group individual.

A significant decreased LF/HF ratio (low frequency/ high frequency) in yoga & exercise group compared with control, and yoga group showed further decrease in ration compared with exercise group, indicating a switch towards vagal dominance. In other studies the LF/HF ratio decreased but this change was not significant [11]. An increased LF/HF ratio is often seen in older age[12] but has also been related to depression and stress[13].

The overall beneficial effect of yoga which is shown to be superior to exercise can be explained by, (a) respiratory modulation involved in yoga. Respiratory frequency & depth which influences autonomic control mechanism. (b) yoga involving pranayama as one of important component helps in reducing chemoreflex sensitivity.(c) Slow controlled breathing in yoga functionally resets the autonomic nervous system through stretch induced inhibitory signals and hyperpolarization currents propagated through both neural and non-neural tissue which synchronizes neural elements in the heart, lungs, limbic system and cortex. Both inhibitory impulses and hyperpolarization current are known to synchronize neural elements leading to the modulation of the nervous system and decreased metabolic activity indicative of the parasympathetic state[14]. (d) increase in HRV in Yoga involving stretch of all muscles can be attributed to reason That after stretching there will be release of vasodilative agents (EDRF = Endothelium-derived relaxing factor) which reduces muscle tone, but could also result from a general systemic psychic-physical relaxation [13].

CONCLUSION

Our study results of yoga shows reduction in LF component, significant decrease in HR & increase in HF component compared to aerobic exercise which coincides with the findings of other studies. This supports that yoga influences autonomic nervous system by increasing parasympathetic activity. Our study indicates that parasympathetic activity is substantially greater in yoga practitioners followed by athletes and control. Yoga proves to be as effective as or better than exercise at improving cardiac health and maintenance of autonomic balance. Hence yoga can be implemented in preventing life style associated disorders.

Conflict of Interest : Nil

Source of Funding : Not applicable

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Visual Evoked Potential in Diabetics – A Non-invasive Study

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ABSTRACT

Background: Prevalence of diabetes mellitus is increasing worldwide, more commonly due to improved lifestyle changes. It is particularly more common in developing countries. Involvement of peripheral, central & autonomic nervous systems are frequently encountered. Diabetes is associated with visual impairment, which if not detected early, can lead to early disability in patients. Visual evoked potential (VEP) is a non invasive method to assess visual pathway. Present study was done to evaluate impact of diabetes on central nervous system, particularly visual functions.

Aims and Objectives: To analyse visual evoked potential in diabetes and age matched controls.

Materials and Method: 60 diabetics (NIDDM and IDDM) attending medical out patient department of Bapuji & Chigateri hospital, Davngere and 60 age matched controls selected randomly from general population were subjected to visual evoked potential. Parameters such as latencies of N^{70}, P^{100} and N^{155}, peak to peak amplitude of waves N^{70}-P^{100} and P^{100}-N^{155} were assessed and analyzed by using unpaired student T test for comparison between cases and controls and one way ANOVA for multiple group comparisons within diabetics based on duration of diabetes and fasting blood sugar levels.

Results: patients with diabetes mellitus have subclinical visual impairment as revealed by impaired visual evoked potential. Diabetics showed delayed latencies and reduced amplitude of various parameters of VEP. There was a positive correlation between prolongation of latencies and duration of diabetes and FBS levels.

Conclusion: present study correlates with earlier findings that visual pathway gets involved in diabetics even before the development of retinopathy which can be detected using VEP. Meticulous control of blood sugar levels is a must to prevent complications of diabetes, so that further damage can be prevented.

***Keywords:** Diabetes mellitus; vision; visual evoked potential (VEP); VEP & duration of diabetes mellitus; VEP & FBS levels; waves N70 & P100;*

INTRODUCTION

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia , caused by complex interaction of genetics and environmental factors. Factors causing hyperglycemia include, reduced insulin secretion, decreased glucose utilization and increased glucose production.

Worldwide prevelance of diabetes has risen dramatically over the past two decades from an estimated 30million cases in 1985 to 285 million in 2010 .[1] Prevalence in adults is found to be 2.4% in rural and 4-11.6% in urban dwellers.[2] According to latest 2016 data from world health organisation , globally an estimated 422 million adults are living with diabetes mellitus. In India, diabetes currently affects more than

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62 million Indians, which is more than 7.1% of adult population.[15] Based on current trends, more than 360 million individuals will have diabetes by the year 2030. Diabetes mellitus increases with aging. Worldwide estimates project that, in 2030 the greatest number of individuals with diabetes will be 45-64 years of age.[1] It is a set of clinical syndromes that affect distinct regions of the nervous system, singly or combined, encompasses wide range of abnormalities affecting proximal and distal peripheral sensory and motor nerves and autonomic nervous system[3].

Cranial nerve mononeuropathies are commonly observed in diabetes. The 3rd, 4th and 6th nerves are involved, separately or in varying combination. Optic nerve affection manifested as optic atrophy, as a result of diabetes alone is estimated to occur in 0.6% cases[7]. The significance of these changes has proved to be difficult to be investigated, as for many years, electroencephalography (EEG) was the only technique available to study the electrophysiological activity of the brain. However, the information provided by this method is limited, particularly in assessment of deeper brain structures. The advent of advanced electro-neurophysiological techniques to assess cerebral function, such as measurement of electrical evoked potentials like visual evoked potential (VEPs), have increased our understanding of normal visual function and possible effects that diabetes may exert[6].

AIMS AND OBJECTIVES

The present study was conducted to evaluate visual evoked potential to pattern reversal stimulation in a group of subjects with type I and type II diabetes mellitus. The aim was to find whether the VEP latencies are altered or not, and if altered, whether it shows any correlation with fasting blood sugar (FBS) and duration of diabetes mellitus.

MATERIALS AND METHOD

Methodology:

The study was conducted in the department of Physiology, J.J.M. medical college, Davangere. In this study, diabetics (total 60) between 25 to 55years attending medical outpatient department of Bapuji hospital and Chigateri General hospital attached to J.J.M. medical college were selected and 60 normal age matched subjects were selected randomly from the general population. Inclusion criteria:Age group between 25 – 55 years, patients who are biochemically proved diabetes mellitus, Patients of type I and type II diabetes mellitus, Normal healthy age matched controls between 25-55 years.

The groups are divided as follows, Group 1→ 60 controls, age matched healthy individuals, Group 2→ 20 diabetics with duration less than 10 years, Group 3→ 20 diabetics with duration 10-15 years, Group 4→ 20 diabetics with duration more than 15 years. Based on FBS (Fasting blood sugar) levels, Good control→ less than130mg/dl, Fair control→ 130-145mg/dl, Poor control→ more than 145mg/dl.

Age group below 25 years and above 55 years, Patients with visual acuity less than 6/18 even with corrected lenses, Patients with acute complication of diabetes like, diabetic ketoacidosis, recurrent ketonuria, non ketotic hyper- osmolar coma and hypoglycaemia, Patients with diabetic retinopathy, cataract, glaucoma, vitreous opacities, optic atrophy, maculopathy, Patients taking psychoactive drugs or drug addiction, H/O Hypertension, anaemia, stroke, dementia, Smokers, Alcoholics, H/O cardiovascular or neurological disorders were excluded from the study. Written and informed consent were taken for the study after explaining the procedure and its significance in their vernacular language. The ethical committee clearance was taken. A brief personal history was taken and a clinical examination of all the systems was done to exclude medical problems and to prevent confounding of results. Detailed ophthalmological check up of all patients was done which includes visual acuity, ocular tension and fundus examination.

After selecting the subjects, they were subjected to VEP testing on PC based, 2 channel, RMS EMG. EP MARK II machine manufactured by RMS RECORDERS and MEDICARE SYSTEM, Chandigarh. Procedure in brief: Recording was carried out in a quiet and dimly lit room. Subjects were asked to come without applying oil to scalp and to shampoo hair and make it dry.

VEP RECORDING: VEPs were recorded using the RMS machine and standard silver- silver chloride disc electrodes. A VEP monitor displaying checker board is used to give the pattern reversal stimulus. A montage consisting of one channel is used for the VEP recording. The subject is asked to sit comfortably in front

of the checkerboard pattern at an eye screen distance of 100cm. An amplification which ranged between 20,000 and 1,00,000 was used to record the VEPs. The electrode impedance was kept below 5KΩ. The recording was performed in a dark and sound attenuated room. Uniocular stimulation was given to both eyes separately with black and white checks which changed phase (black to white and white to black) abruptly and repeatedly at a specified number of reversals per second, by using a checkerboard.

The usual glasses (if any) were allowed to be put on during the test. The subject is instructed to avoid the usage of meiotic or mydriatic drugs, 12 hours before the test. The electrodes were placed with an electrode paste after cleaning the site with a spirit swab. The scalp electrodes were placed relative to bony landmarks. The anterior/posterior midline measurements were based on the distance between nasion and inion over the vertex. The active electrode was placed in the middle of the variation zone of the calcarine fissure at Oz, which is the highest point on the occiput. The reference electrode was placed at Fz or 12cm above the inion. The ground electrode was placed over the forehead Cz.

RESULTS

TABLE 1: Comparison of VEP parameters between Diabetics and Healthy controls in left eye.

LATENCIES LEFT EYE (ms)	Cases (N=60)		Controls (N=60)		Unpaired t Test	
	Mean	Std. Deviation	Mean	Std. Deviation	t Value	P Value
N_{70}	74.09	4.39	68.04	1.47	10.11	P<0.001
P_{100}	105.69	6.15	96.93	1.33	10.76	P<0.001
N_{155}	139.10	4.76	131.62	3.18	10.12	P<0.001
AMPLITUDE LEFT EYE(μv)						
N_{70}-P_{100}	3.59	1.47	6.61	0.85	-13.81	P<0.001
P_{100}-N_{155}	6.28	2.06	8.91	1.05	-8.79	P<0.001

TABLE 2: Comparison of VEP parameters and Duration of Diabetes in left eye.

LATENCIES LEFT EYE(ms)	DURATION			ANOVA	
	<10 =20)	10-15 (N=20)	>15 (N=20)	F Value	P Value
N_{70}	71.86 ± 3.3	74.7 ± 4.18	75.72 ± 4.81	4.61	P<0.01
P_{100}	98.87 ± 1.5	106.5 ±4.40	111.84 ± 3.06	77.7	P<0.001
N_{155}	137.9 ±4.87	139.31 ± 3.19	140.1 ± 5.92	1.05	0.35
AMPLITUDE LEFT EYE(μv)					
N_{70}-P_{100}	5.2 ±0.65	3.48 ±0.81	2.01 ± 0.64	102.3	P<0.001
P_{100}-N_{155}	8.48± 0.57	6.44 ±1.12	3.78 ±0.45	174.8	P<0.001

TABLE 3: Comparison of VEP parameters and FBS levels in left eye.

LATENCIES LEFT EYE(ms)	FBS			ANOVA	
	< 130 (N =47)	130-145 (N=6)	>145 (N=7)	F Value	P Value
N_{70}	70.5 ± 1.81	72.5 ±4.0	74.8 ±4.4	3.73	0.03
P_{100}	98.23 ± 1.1	99.12 ±0.99	107.6 ±5.5	16.22	P<0.001
N_{155}	139.5 ± 4.8	139.5 ± 3.16	136.99 ± 5.17	0.78	0.46
AMPLITUDE LEFT EYE(μv)					
N_{70}-P_{100}	5.14 ± 0.61	5.06 ± 1.08	3.17 ±1.3	12.25	P<0.001
P_{100}-N_{155}	8.91 ±0.43	7.83± 1.42	5.69 ± 1.86	13.14	P<0.001

DISCUSSION

Central diabetic neuropathy is a newer concept and it can be detected by simple and non- invasive methods. The methods used in the present study are visual evoked potential (VEP) and Event related potential P_{300} (ERP P_{300}). Visual evoked potential relies on measurement of latencies and amplitude of waves arising after giving uniocular visual stimulus in the form of black and white checks which changed phase, by using a checkerboard. Consecutive waves N_{70}, P_{100} and N_{155} reflect the electrical activity of primary visual cortex and visual association areas. They are also used to assess the visual pathway, which runs from retinal ganglion cells to visual cortex.

In our study we found that there was prolongation of latencies of waves N_{70}, P_{100} and N_{155} (p<0.001) and reduced amplitude of N_{70}-P_{100} and P_{100}-N_{155} (p<0.001) in diabetics compared to controls in both eyes. The P_{100} waveform is generated in the striate and peristriate occipital cortex, N_{70} reflects activity of the fovea and primary visual cortex while N_{155} reflects activity of visual association areas.[6]The delayed latencies and reduced amplitude which were recorded even in the absence of retinopathy or any ocular pathology is indicative of anterior visual pathway affection.[7] Also VEP detected damage in retinal ganglion cell in diabetics. This ganglion cell damage is considered as a sign of preclinical diabetic retinopathy, as no signs of diabetic retinopathy were detected in

patients on ophthalmoscopic examination.[8,9] similar findings were reported earlier by Chopra D et al [6], Essam M Ebrahim et al[10].

Comparison of VEP parameters with duration of diabetes mellitus

In our study, we found that the latencies of N_{70} and P_{100} were significantly prolonged in diabetics with duration of illness between 10-15years and more than 15 years compared to duration of less than 10 years (p<0.01, p<0.001) respectively. There was also significant reduction in amplitude of N_{70}-P_{100} and P_{100}-N_{155} (p<0.001) in diabetics of longer duration in both eyes. The present study concurs with findings of V. Gayathri et al., studies have shown that alterations in VEP latency are not present at the onset of diabetes, but occur only after the disease has been present for a mean of atleast 3.3 years. Retinal, macular and visual pathway function is differently impaired in diabetes patients with different duration of disease, having no signs of retinopathy. The impairment starts in the nerve conduction of the visual pathways with an early involvement. It is carried on into the innermost retinal layers and in the macula and ends in the middle and outer retinal layers.[5] Similar findings were reported in Siedl R et al[11] .

Comparison of VEP parameters with FBS levels.

In our study, we found, significant prolonged

latencies of N_{70} and P_{100} in diabetics with FBS 130-145mg/dl (fair control) and more than 145mg/dl (poor control) compared to diabetics with less than 130mg/dl (good control) (p<0.03, p<0.001). Also, there was significant decrease in amplitude of N_{70}-P_{100} and P_{100}-N_{155} in diabetics with poor glycemic control (p<0.001) in both eyes respectively. Similar findings were found in Kumar R et al[12].

According to Pozzessere G et al[13] , increasing evidence suggests that the accumulation of glucose susbstrate, as a consequence of relative lack of insulin, increases aldose reductase activity. The increased enzyme activity of alternate polyol pathway at different level, including vessel walls, retina and particularly nerve complex metabolism, may slowly and progressively impair neurologic functions. Ziegler O et al[14], in their study showed that, after 3 days of close blood glucose monitoring the mean latencies were significantly shorter but were still significantly longer than control values

CONCLUSION

Our study provides a glimpse about the effect of diabetes mellitus on vision, which brings about changes in VEP parameters. Although we understand to some extent these changes and also since only a few studies have been done on this aspect, further research is needed to study the effect of diabetes mellitus on the visual aspects. VEP abnormalities in diabetes initially seem to appear due to central impairment of visual pathway. Thus, VEP can be of clinical importance for diabetes, as it reflects the degree of neural affection and may alert patients for adequate glycemic control, which can resist neuropathic progression any further. Although from our study we can say that duration of illness and poor glycemic control are definitve risk factors for the development of central neuropathy, a larger sample size would have had a significant outcome. As diabetes is widespread in our country, it is necessary to consider "Visual impairment as a long term complication of diabetes". It is recommended to perform VEP initially on all diabetic patients and to keep this as an "initial record of visual examination of patients". Also, performing the test every year on a regular basis could help the physician to update record of visual status of the patients as well as to give necessary guidance in regard to the control of diabetes to them.

Limitations:

The present study may have included more number of subjects for better interpretation of results.

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Normative Data for Peak Latencies and Amplitudes of P100 wave of Pattern Reversal Visual Evoked Potential in Central Indian Population

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ABSTRACT

Introduction: The visual evoked potentials (VEPs) is an important diagnostic tool used by neurophysiologist, ophthalmologist, neurologists and neurosurgeons as many neurological disorders present with visual abnormalities , particularly when the clinical signs and the results of neuroimaging methods are either non informative or non-conclusive. VEPs are produced by electrical activity of the visual cortex in response to light or pattern stimulation of the eye. It can detect functional loss in the visual pathway from retina to the visual cortex.

Aims and objectives: The study was planned to report the normative data for VEP P100 latencies and amplitude in normal subjects aged 40-60 years.

Methods : This study included 60 healthy subjects between the age group 40- 60 years consisting of both males and females. VEP was recorded using pattern reversal stimulation with RMS EMG MARK II machine. P100 wave latencies and amplitudes were obtained in all the subjects to determine the normative values.

Results: In our study, normal mean value of P100 latency was 98.79 ± 5.75 milliseconds and mean P100 amplitude was 7.45 ± 1.14 microvolts.

Conclusion: The normative values for P100 latencies and amplitudes of PR- VEP in normal adults of Central India have been reported in the present study. These can be used for evaluation and interpretation of various VEP abnormalities. The normal values of VEP may be affected by technical factors related to machine and environment settings in different labs. So, each health care institution should have its own reference values according to normative data for their lab for VEP to improve the accuracy of the test.

Keywords: Normative, Pattern reversal, Visual Evoked Potential, P100 wave, latency, amplitude

INTRODUCTION

Electrical potentials that occur in the cortex after stimulation of sense organ, which can be recorded by surface electrodes, are known as Evoked Potentials. e.g. Somatosensory Evoked Potential (SEP), Auditory brainstem response (ABR) and Visual Evoked Potential (VEP). VEPs are produced by electrical activity of the visual cortex in response to light or pattern stimulation of the eye. It can detect functional loss in the visual pathway from retina to the visual cortex.1

The visual evoked potentials is an important diagnostic tool used by neurophysiologist, ophthalmologist, neurologists and neurosurgeons as many neurological disorders present with visual abnormalities , when the clinical signs and the results of neuroimaging methods are either non informative or non-conclusive.2 Visual Evoked Potentials can

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provide important diagnostic information regarding the functional integrity of the visual system.

The VEP is very useful in detecting an abnormality in anterior visual conduction pathway .3　It is most useful in detecting optic nerve function and less useful in retrochiasmatic disorders in which , the MRI is a more useful test.4

Normal VEP: The usual waveform is the initial negative peak (N1 or N75) followed by a large positive peak (P1 or P100) and followed by another negative peak (N2 or N135). Of these, P100 is said to have the origin in the visual cortex. Clinical interpretation of PVEP is largely based on latency and　amplitude of major positive peak P100. It derives its name from the fact that it occurs approximately 100 msec after the stimulus onset and is most　consistent , least variable peak and reproducible waveform as compared with N75 and N 135 waves which is　generated in striate and parastriate visual cortex in response to visual stimulus. It thus measures the velocity of nerve conduction and synaptic transmission.3,5　Reductions in the number of receptors, axons in the optic nerve, etc reduce the amplitude of the response while slowing of the conduction in the visual pathway produces prolongation of the latencies.5

The key purpose of the study was to assess and establish normative　data for peak latencies and amplitudes of P100 wave of PR-VEP in　population of central india.

AIMS AND OBJECTIVES

The study was planned to establish the normative data for VEP P100 latencies and amplitude in normal subjects aged 40-60 years.

MATERIALS AND METHOD

The study was conducted in the Neurophysiology lab in the department of Physiology, Gandhi Medical College, Bhopal. The　study comprised of 60 healthy subjects within the age group 40 – 60 years, in which there were 30 males and 30 females. Approval from the institutional ethical committee was taken to carry out the research work. A complete clinical examination of each subject was done after obtaining a written informed consent and detailed clinical history.

Occular examination findings were noted which include determination of visual acuity by Snellen's chart and near vision chart, ocular movements, pupil reactions, confrontational visual field screening. Direct ophthalmoscopy was done for the initial evaluation of fundus.

Inclusion criterion

Both male and female subjects with visual acuity 6/6 with normal pupillary reactions, normal fundus and full and normal field of vision.

Exclusion criterion

Presence of any illness that could influence visual evoked potential, subjects with history of serious visual problems, any major chronic ophthalmic disease, traumatic optic nerve atrophy, multiple sclerosis, retrobulbar neuritis, glaucoma, ishaemic optic neuropathy history of major illness like diabetes, hypertension, HIV infection, hereditary and degenerative diseases, history of drug abuse and history of cerebrovascular accidents, recent eye medications with mydriatics and cyclopegics prior to the test were excluded from the study.

On the basis of detailed clinical examination, subjects were recruited for the study.

Patients were subjected to VEP test on RMS EMG EP MK-II machine in the Neurophysiology unit of Department of Physiology, Gandhi Medical College, Bhopal.

Visual Evoked Potential (VEP) Test -

Pre test evaluation - Participant preparation for PRVEP test

The subjects were advised to come without oil or any hair chemical to the scalp.

They were instructed to have an adequate sleep the previous night to prevent the effect of drowsiness on the responses.

Subjects were explained about the procedure in detail to ensure full co-operation and avoid apprehension

VEP instrumentation room set-up-

Equipment –

VEP was recorded with a pc based, two channel, RMS EMG EP MK II machine -equipped with pattern-shift stimulator television screen, signal amplifier with

filters, computer system for averaging.

VEP was performed in a specially equipped electro diagnostic procedure room, made dark and sound attenuated for the test. Subjects were seated comfortably about 100 cm away from a video monitor.

Electrodes and Electrode Placement -

Standard surface electrodes were placed according to the international 10/20 system of electrode placement **(ISCEV standards, 2009).**6

This system specifies the position of scalp electrodes as percentage of distances between definitive landmarks such as nasion, inion and ear tragus (Figure 1). The placing of the electrodes as well as the nature of PVEP testing was explained to each participant.

The recording electrodes were placed on the scalp at the following reference points:

Oz (Occipital region) = Active or recording electrode

Cz (Vertex) = Ground electrode

Fz (Frontal region or forehead) = Reference electrode

Head size measurements were taken from nasion to inion prior to the electrodes placement. To apply the electrodes, conductive electrode paste was applied on the marked electrode locations to make sure a good, stable electrical connection between the scalp and the electrodes was made. Each electrode was pressed firmly onto the scalp with the help of contact paste .Micropore gauze was placed on top of the electrodes to ensure their contact was maintained. The electrode impedance was kept below 5 kΩ.

VEP Recording-

A montage consisting of one channel (Oz-Fz) was used for VEP recording. The video- monitor presented a black and white checkerboard pattern with a fixation spot in the centre of the screen (mean luminance 50 candela/m2 and contrast 70%). At the viewing distance of 100 cm, the check edges subtend a visual angle of 15 minutes with video monitor screen subtending an angle of 12.5°. The checks / pattern elements reversed alternately at a rate of twice per second. The bioelectric signal was amplied (gain 20,000), filltered (band-pass, 1-100 Hz), and 150 events free from artifacts were averaged for every trial. Every time the pattern alternates, the subject's visual system generates an electrical response that was detected and recorded by surface electrodes, which were placed on the scalp overlying the occipital and parietal regions with reference electrodes on the midline of frontal region (Fz). Subjects were instructed to fix the gaze on a small red coloured block at the centre of the screen of video monitor (Figure 2). Monocular stimulation was done with an eye- patch covering the other eye.

PRVEP instructions given to participants :

The participants were requested to remain comfortable and relax when viewing the checkerboard screen. They were instructed to maintain a normal blink rate to ensure a clear optical image. Also, if the subject experienced any discomfort he or she was asked to mention it. The participants were instructed to maintain their focus on the central red coloured block in the centre of the display screen.

PVEP waveform and markings --PVEP recording parameters

With the preset stimulus and recording conditions as mentioned above and keeping the electrode impedance <5 kΩ, the recording procedure was started. To verify the reproducibility of the waveform, two responses were recorded and superimposed. Trials were repeated if there was inconsistency of the response.The PVEP waveform thus obtained was used for measurements.

The waveforms were labeled for the peaks N75, P100 and N145. The latency of the response was measured from the sweep onset that corresponded to the presentation of the stimulation. The first major positive peak (P100) was measured after stimulation of each eye. The parameters taken for the study were P100 latency of the waveform measured in milliseconds (ms), and N75-P100 amplitude which is measured from the peak of N75 to the trough of P100 (N75-P100), in microvolts (µV) in both eyes.

Statistical Analysis:

The mean and standard deviation for latencies and amplitudes of VEP waves was obtained. The values were taken as VEP electrophysiological data (normal values), for our laboratory, in persons in this region.

RESULTS

Our study comprised of 60 healthy subjects between the age group of 40-60 years. The mean latency of P100 wave in normal subjects was 98.79±5.75 milliseconds. The mean P100 amplitude was 7.45±1.14 µV.

Table 1 : Normative values of PRVEP P100 latency and amplitude

Parameter	Mean	Standard Deviation
P100 latency (ms)	98.79	5.75
N75-P100 Amplitude (µV)	7.45	1.14

Table 2 : Comparative values of PRVEP P100 latency and amplitude (present study vs others' report)9-13

Author / year	Recording montage	no. of subjects	Age (years)	P100 latency(ms)	Amplitude (µV)
Celesia et al.,1987	Oz-Fz	112	20-75	98.1±4.4	9.9±5.9
Guthkelch et al.,1987	Oz-Fz	16	18-30	100.04±3.9	
O P Tandon, 1989	O1-A1 and O2-A2	27	17-35	94.25±7.14	6.53±2.44
Mishra and Kalita, 1999	Oz-Fpz	58	15-58	96.9±3.6	7.8±1.9
Jayshree P, 2008	Oz-Fz	146	1-75	97.6±2.3	6.79±3.3
Present study	Oz-Fz	60	40-60	98.79±5.75	7.45±1.14
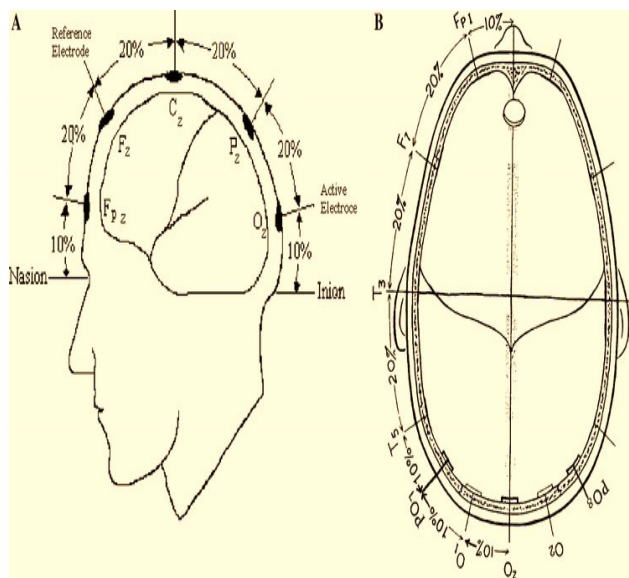
Fig. 1 : Electrode placement
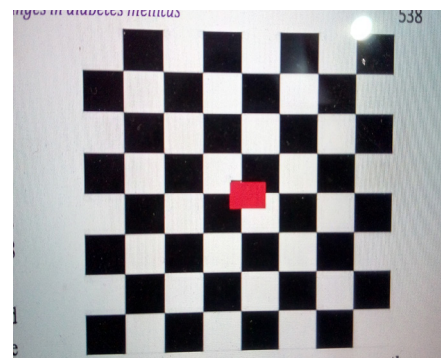
Fig. 2 : Checkerboard pattern for PR – VEP

DISCUSSION

VEP is an important diagnostic tool for evaluating visual function and is highly sensitive to lesions of the optic nerve anterior to chiasma. It is used to assess the functional integrity of visual pathway from retina upto visual cortex.

In our study, the mean latency of P100 wave in normal subjects was 98.79± 5.75 milliseconds. The mean P100 amplitude was 7.45+_1.14 µV (Table 1).

The values of P100 latencies and amplitudes in the present study are comparable to VEP studies in other

regions (Table 2). 7-11

Shibasaki H and Kurowia Y reported the mean peak latency of P100 wave as 92.5+ 4.44.12 Another study done by Kamra M et al., 2014 in north indian population reported 102.5+ 5.21 and 5.18+ 2.11 for P100 latency and amplitude respectively.13 The value reported by Shahrokhi et al. (1978) for P100 latency was 102.3+5.1. and 10.1+4.2 for P100 amplitue.**14** In an Indian study conducted by OP Tandon, the value reported for P100 latency was 94.25+ 7.14 and 6.53+ 2.44 for P100 amplitude.**9**

The primary reason for this disprepancy could be the representative population which in our study comprised of middle aged and elderly subjects and the difference in technical factors used for recording and recording instrument which differs from institute to institute. So, there is need for each institute to have its own parameters according to the device.

CONCLUSION

In conclusion, we have reported normative data on peak latencies and amplitudes of P100 waveform in central indian population that will provide baseline criterion for evaluation and interpretation of various VEP abnormalities. The values of P100 latencies and amplitudes in the present study are comparable to VEP studies done in other regions. The values are affected in relation to machine, technical factors used for recording and environmental settings in different laboratory. Each neurophysiological laboratory doing VEP studies should have its own normative values for reference to facilitate clinical interpretation.

Conflicts of Interest: None

Source of Funding: None

Ethical Issue: None

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Platelet Profile of Cord Blood in Infants of Diabetic Mothers

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ABSTRACT

Background: Infants of diabetic mothers (IDM) are prone to a number of immediate neonatal complications when compared to the babies born to normal mothers. Diabetes mellitus is a risk for the health of both pregnant women and her infant. Its unfavorable effects start in utero and continue after birth. It is known that gestational diabetes mellitus (GDM) increases oxidative stress and decreases antioxidant enzyme activities. Maternal glycemic control has been one of the parameters that determines the occurrence of these problems. In present study we aimed to investigate cord blood mean platelet volume (MPV) of infants of diabetic mothers (IDM). **Method:** Forty pregnant women with GDM between 37 to 40 gestational weeks were enrolled as study group together with 40 healthy pregnant women as a control group. The two groups were compared in terms of demographics parameters like weight, length, and head circumference of babies. Two milliliters of umbilical venous blood were obtained to study platelet parameters and MPV levels. **Results:** There was statistically significant increase in MPV (p <.05) in IDM as compared with control group. **Conclusion:** MPV is useful for representing the potential oxidative stress of IDM. The mean platelet volume and other platelet parameters may significantly aid in identification of diabetic pregnants at risk for vascular complications.

Keywords: *Cord blood, Gestational diabetes mellitus, Mean platelet volume, Morbidity, Oxidative stress.*

INTRODUCTION

Diabetes mellitus is the commonest endocrinal disorder,causing considerable morbidity and mortality to both mother and fetus [1]. Its incidence is increasing among urban population at an alarming rate, due to stress inducing life style. It involves derangement of carbohydrate, fat and protein metabolism characterized by hyperglycemia, hyperlipidemia and negative nitrogen balance [2].

The term "Infant from diabetic mother" (IDM) refers to those from pregnancies complicated by diabetes mellitus (DM type 1, type 2) or gestational diabetes mellitus(GDM) [3].

Prevalence of GDM is increasing worldwide and it is reported to range from 1% to 14% in the literature [4]. Increasing age and obesity are the risk factors. Diabetes mellitus in pregnancy is associated with increased rate of complications like preeclampsia, polyhydramnios, fetal macrosomia and operative delivery. Early diagnosis and treatment is important for prevention of complications.

Newborns from diabetic mothers are more frequently born prematurely, large for the gestational age and with risk of respiratory distress syndrome (RDS) and subsequently, exposed to a higher risk of perinatal distress, hypoxia, metabolic stress and hematologic alterations[5]. Probably, classically described modifications such as myocardial hypertrophy, accelerated growth, polycythemia, modified blood rheology and cerebral perfusion found in the intra-uterine life are due to the chronic adaptation mechanisms to the continuous metabolic stress of hyperglycemia[6,7]. Hypoglycemia,hypocalcemia, hyperbilirubinemia and polycytemia are some of the complications seen in the IDM. Besides increase in perinatal mortality, there is increased risk of developing obesity , impaired glucose tolerance and DM in childhood period [8].

Literature about increased oxidative stress and decreased antioxidant enzyme capacity in pregnant women with GDM is limited[9].These changes may be associated with increased risk of vascular disease and

venous thromboembolism[10-12].

Patients with DM show altered platelet function, including decreased nitric oxide synthase activity and increased peroxynitrite production[10-12]. Platelet volumes are direct indicators of increased platelet synthesis[13]. In normal pregnancies, there is a small increase in platelet aggregation.This is compensated for by increased platelet synthesis and, consequently, increased mean platelet volume (MPV)[12-15]. These changes in platelet volumes may be more sensitive than platelet numbers as a measure of a platelet morphology and altered platelet function[16-18].

The present study was designed to assess and compare laboratory findings of platelet profile in healthy pregnant women and diabetes patients. Our aim is to investigate cord blood MPV levels as a sign of oxidative stress in the IDM.

MATERIALS AND METHOD

Present study was conducted at Department of Physiology in Kamineni Institute of Medical Sciences, Narketpally, Nalgonda District, Telangana in collaboration with Department of Obstetrics and Gynecology. It was a prospective case control study conducted in 80 newborns during August 2015 to September 2016 over a period of 14 months. The approval of ethics committee was obtained.

They were divided in to 40 Diabetic women with singleton pregnancy between 37-40 gestational weeks (study group) and 40 age matched healthy pregnant women as control group. Patients who refused to participate, those suffering from cardiovascular disease, thyroid disorder, anaemia, toxemia of pregnancy and multiple gestation were excluded.

All subjects were informed in detail about aim, objectives and procedure of the study and written consent was taken for conduct of study.

Maternal weight, height and body mass Index (BMI) was calculated. Their blood glucose and HbA1c levels were measured.

APGAR scores at 1st minute and 5th minutes, birth weight & length was recorded and Ponderal index (PI) was calculated. It is a weight-height related parameter used to predict fetal growth pattern in small-for-gestational age infants and for large-for-gestational age (LGA) infants . It is calculated using formula: PI = weight (g) x 100/(height,incm^3) [19].

After resection of the umbilical cord, the cord stump remaining on the placenta was cleaned and 2ml of blood was collected and analyzed for Platelet profile (Platelet count, Mean platelet volume (MPV) Platelet distribution width (PDW) using automated hematological analyzer.

Statistical Analysis

Data were recorded using the SPSS 15.0 statistical software package (SPSS Inc., Chicago, IL, USA). Descriptive data was expressed as Mean±S.D and student's t- test was used for comparison between the groups. p-value <0.05 was considered to be significant.

RESULTS

Table 1: Maternal characteristics of case and control groups (N=80)

S.No	Characteristics	Diabetic pregnant women (n=40) Mean±SD	Normal pregnant women (n=40) Mean±SD	p-value
1	Age of mother(yrs)	30.6 ±4.1	26.8±2.2	<.05
2	Gestation at delivery (wks)	38.1±1.1	38.5±1.2	>.05
3	Body mass Index (kg/m2)	26.8±2.5	22.1±1.4	<.05
4	HbA1c	5.9± 1.1	4.8±0.5	<.05

It represents maternal age, BMI and HbA1c was significant

Table 2: Apgar score assessment at birth (N=80)

S.No	Apgar score		Newborn of Diabetic mother (n=40)	Newborn of healthy mother (n=40)
1	Apgar 1 min	8-10	24	27
		5-7	10	12
		<5	6	1
2	Apgar 5min	8-10	28	31
		5-7	11	9
		<5	1	-

Apgar score assessment at birth did not show any significant difference between two groups

Table 3: Anthropometric parameters of newborn at birth (N=80)

S.No.	Characteristics	Newborn of Diabetic mother (n=40) Mean±SD	Newborn of healthy mother(n=40) Mean±SD	p-value
1	Neonate Birth weight (gms)	3010.2±520.5	2950.7±550.8	>.05
2	Poderal Index (g/cm3)	2.4±0.2	2.5±0.2	>.05

Demographic characteristics of the newborns between two groups which was not significant.

Table 4: Cord blood Platele profile in neonate of diabetic and non- diabetic mothers (N=80)

S.No	Parameters	Newborn of Diabetic mother (n=40) Mean±SD	Newborn of healthy mother (n=40) Mean±SD	p-value
1	Platelet count Lakh/mm^3	1.98±7.96	2.44±6.83	<.05
2	MPV fL	8.54±1.68	7.43±0.47	<.05
3	PDW%	13.32±4.47	13.32±0.85	>.05

Platelet count was significantly higher in control group than in diabetic group. MPV was significantly higher in IDM group. There was no significant difference in Platelet distribution width (PDW) between two groups.

DISCUSSION

Pregnancy is a physiologically increased stress condition and it is aggrevated in complicated pregnancies. Kharb[20] claimed that low insulin sensitivity is the cause of the oxidative stress and leads to free radical production. Because GDM markedly triggers oxidative stress and MPV directly shows the response of the thrombocytes to the stress, MPV may be used as a marker for oxidative stress.

We found a significant elevation in the cord blood MPV in IDM then control group. It is effective marker of blood glucose[1,2]. It was found to be higher in diabetic and pre-diabetic with impaired fasting glucose[21,22]. However, after the blood glucose was reduced, there was a significant decrease in these values[1,17].

MPV is a marker of platelet function and activation[1,2]. Patients with high MPV had low platelet counts. It has been reported that platelet survival is shorter in diabetic patients[21]. This may be explained by variables such as platelet production and mean platelet survival. The platelet distribution width displays a good correlation with the MPV[1,2].

Patients with diabetes have increased platelet activation compared to non-diabetic [1,17]. Their hyperactivity may potentially have a role in the development of vasculopathies[11-15]. It is accompanied by increased thromboxane synthesis and/or decreased prostacycline production. Larger platelets are both more reactive and aggregable[23].They contain denser granules, secrete more serotonin and b-thromboglobulin, and produce more thromboxane A2 than smaller platelets. This relates to a relationship between platelet function and micro and macrovascular complications of diabetes mellitus [1,2,21].

The platelet count is slightly lower in pregnant than in non-pregnant women[24]. It also decrease with increase in duration of pregnancy [25]. Normally interleukins, specially IL-6 is required to convert uncommitted stem cell to committed stem cells of megakaryocytic series. The IL-6 in neonate of diabetic mother loses its hemopoietic potency due to immune-modulatory effect of diabetic maternal IL-6 resulting in decreased platelet count. It is also attributed to fetal hypoxia due to placental abnormality in diabetic group.

CONCLUSION

Mean Platelet volume and other platelet-related parameters is a simple procedure, available in most hospital laboratories. It is useful for representing the potential oxidative stress of IDM. Hence, there is need to creat more awareness by pre-pregnancy counselling of know diabetics as well as screening for potential gestrational diabetics. MPV may be used as a marker for follow-up of diabetic patients

Limitation

It was performed in a single hospital and limited number of patients, therefore sample may not be representative of all Indian women. We recommend a cross-sectional multicentric study to confirm results of present study & to define possible relationship between platelet profile in diabetes mellitus in pregnancy.

Source of Funding: No external source of funding

Ethical Clearance- Taken from Institutional Ethical Committee

Conflict of Interest: Nil

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Enhancing the Students Understanding of Place Theory of Hearing Using a Sonometer

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ABSTRACT

The place theory of hearing considers the basilar membrane to be a series of stretched strings with different resonant frequencies. We have attempted to enhance the students understanding of this concept using a small group demonstration with a sonometer. Our results show that ninety five percent were of the opinion that this demonstration enhanced their understanding, ninety percent opined that this demonstration helped review this topic. We conclude that our model is suitable for resource limited settings and can be used for small group discussions.

Keywords: *Place theory of hearing, sonometer*

INTRODUCTION

The first MBBS students are introduced to the various theories of hearing in their curriculum. One among the theories is, the "*Place theory of hearing*" proposed by Georg v. Békésy. The place theory of hearing considers the basilar membrane like a series of stretched strings each, resonating at a different frequency[1]. We felt that, explaining the theory with a demonstration along with the conventional lecture would enhance the students understanding of this concept.

Life size micro-machined models[2,3], real time visualization of the oscillations of the model could be done[1]. However we felt that usage of cost effective items to would be better in resource limited settings. Hence we chose to use the sonometer for this demonstration.

MATERIALS AND METHOD

A wooden sonometer, along with tuning forks (128 hz, 256 hz, 512 hz and 1024 hz) of various frequencies

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were used in the demonstration. The demonstration was done to first year medical graduates in small groups of 15 each. The students had already attended a lecture on theories of hearing a week back.

A schematic of the sonometer is shown in Figure 1. When a vibrating tuning fork is placed on the top of the sonometer, the stretched string between the two wooden bridges begins to resonate if the length is appropriate. The length can be quickly determined by adjusting the wooden bridges. The resonance can be demonstrated by placing a rider paper over the string, when the string resonates, the rider paper falls. Thus different lengths of the stretched string resonates at different frequencies.

Prior to the demonstration, the students were briefed what a sonometer was. They were also briefed that, the resonant frequency of the stretched string depended inversely on the frequency (higher the frequency, shorter the length of the stretched string). The students were then demonstrated how tuning forks of different frequencies required different lengths of the stretched string for resonance. They were then asked to imagine the basilar membrane to be a series of such stretched strings each of which would resonate at a particular frequency.

To assess the usefulness of the demonstration, students were asked to give a anonymous written feedback (Table 1).

Figure 1: Schematic of the sonometer. (A) Shows the length of the string when a high frequency (1024 hz) tuning fork would be used. (B) Show the length of the string when a relatively low frequency (512 hz) tuning fork would be used.

RESULTS

The feedback was completed by one hundred and twenty five students. The data collected is expressed as percentage of the total students who responded (see Table 1). 95 % of student opined that this demo helped them in improving their understanding of the place theory of hearing. 89 % percent of students felt that the demo helped them review the topic. 97 % of the students responded that they would recommend this demonstration to future batches of students and 85 % of the students felt that this demonstration made their learning fun and exciting. They used words like "innovative" and "helpful" to describe the demonstration and no comments were negative.

Table 1: Consolidated feedback from students.

Question	Yes (%)	No (%)	Not sure (%)
My understanding of the place theory of hearing improved with this demo	95.2	0.8	4
This demo helped me review the topic	89.6	0.8	8.8
I would recommend such demo for the future batches of students	97.6	0	2.4
Was learning exciting and fun with demo?	85.6	4	10.4

DISCUSSION

Medical students now prefer multiple modes of information delivery to learn4. Demonstrations form an excellent supplement to the traditional didactic lectures. Demonstrations enhances the enthusiasm and interest in learning and thus enhances the active learning and understanding of the subject[5]. The students get time to interact and discuss with the demonstrator and among themselves regarding the concept, which again enhances the students interest in the subject which enhances the students understanding[6,7].

Our demonstration uses a ready made sonometer which costs around Rs 1000 only. For demonstrating to a single group, it took only 15 min. Thus our model could be used in resource limited settings.

Our demonstration uses a ready made sonometer which costs around Rs 1000 only. For demonstrating to a single group, it took only 15 min. Thus our model could be used in resource limited settings.

CONCLUSION

Our model is suitable for teaching the concept of place theory of hearing in small groups. It can be used in resource limited settings and thus can enhance the students understanding of the place theory of hearing by increasing the students enthusiasm and interest in learning.

Conflicts of Interest: Nil

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A Study of Pulmonary Function Test in Workers Engaged in Processing of Natural Rubber

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ABSTRACT

Background : The rubber industries use a greater variety of chemicals than any other branch of industry. The processing area is the site at which workers are exposed to many atmospheric contaminants. The impact of health hazards of latex in this group of workers is highly under reported and it is in this regards that an attempt in this study was made to assess the influence of latex and other chemicals on pulmonary function of workers engaged in rubber processing.

Objective- To assess the pulmonary function of workers engaged in processing of natural rubber

Method – This is a descriptive cross-sectional study involving 50 rubber workers who were selected from camps conducted in different parts of Kottayam district, Kerala.

A portable vitalograph was used to assess the pulmonary functions- FEV1(Forced expiratory volume in 1st second), FEV1/FVC and FEF25-75%(Forced expiratory flow rate). Statistical analysis was done using excel and epi-info

Results- A statistically significant reduction was seen in the FEV1/FVC values among 80% of the rubber workers indicating obstructive airway disease. A statistically significant reduction was seen in the FEF 25-75% values among 26% of the rubber workers.

Conclusion- Rubber workers have a risk of developing obstructive and small airway diseases due to continuous exposure to latex and chemicals which are airway irritants. Health awareness and health promotion activities should be initiated among the workers to prevent and reduce the progress of pulmonary diseases.

***Keywords-** FEF25-75%,Pulmonary function, rubber workers*

INTRODUCTION

Kerala has a long tradition in the cultivation of plantation crops. Presently 45 percent of the total area under plantation crops in India is in Kerala. 85 percent of the total cultivation and 93 percent of the natural rubber production in India is contributed by Kerala. The processing area in rubber industries is the site at which workers are exposed to many atmospheric contaminants. The ingredients are numerous and include primary and secondary accelerators, activators, antizonants, antioxidants, curing agents, fillers, pepticisers, plasticisers, protectives, reinforcing agents, and softeners. Most of these agents are in powder form but at processing temperatures, have enough vapour pressure to be liberated from the rubber matrix to be given off as fumes and vapours. Consequently, workers are exposed

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to various combinations of airborne contaminants. Many of these ingredients are potential respiratory agents with acute or chronic effects. They may be both broncho irritants, predisposing workers to chronic obstructive airway disease or sensitizers, predisposing to bronchial asthma. [1]

The impact of health hazards of latex and other chemicals in this group of workers is highly under reported from this part of the country and it is in this regards that an attempt in this study was made to assess the influence of latex and other chemical exposure on pulmonary function of workers engaged in rubber processing

MATERIALS AND METHOD

This study was conducted over a period of one year after obtaining clearance from Institutional Ethics committee. This was a descriptive cross sectional study. Based on the result of Mean and Standard deviation of pulmonary function tests in rubber workers done by Reddy et al(Lung function parameters, neck pain and associated factors among male rubber tapping workers in kerala) with 95% confidence and 80% power minimum sample size comes to 37,but we included 50 rubber workers and 50 controls in our study. Study subjects were recruited from the camps conducted in the Puthupally and Punjar Panchayats belonging to the district of Kottayam in Kerala. The basic demographic data was collected using a prepared proforma from all subjects. The necessary anthropometric measurements were recorded. The Spirometry was recorded using the portable compact vitalograph. The various indices of the spirometry that were recorded and used for analysis were FEV1(Forced expiratory volume in 1st second), FEV1/FVC and FEF25-75%(Forced expiratory flow rate). Rubber workers who attended the camps were counseled regarding the study protocol and the methodology of the spirometry and after the desired consent was obtained, were selected for the study. Healthy volunteers who were non-rubber workers and were non -smokers and had no prior illnesses were enrolled as subjects for the purpose of controls. Procedure of the test was demonstrated to them individually. It is essential that the subject performing the test is clearly instructed in the procedure prior to the commencement of each test. Care was taken to ensure maximum effort was made by the subject while carrying out the test.[2]

RESULTS

In the present study 50 subjects and controls were enrolled whose pulmonary function test (spirometry) was undertaken. FEV1, FEV1/FVC and FEF25-75% of rubber workers were compared with that of controls. Duration and exposure to chemicals were recorded as part of the analysis. Analysis was done using excel and epi-info.In our study, 14% of the cases had experience as a rubber worker of less than 10 years, 40% between 10 to 20 years and 46% more than 20 years. 86% of the rubber workers were exposed to latex, smoke and chemicals(Formic acid), 4% were exposed to chemicals alone and 10% had been exposed to both chemicals and latex.

Table 1: Mean of the different Lung function tests between case and controls

LUNG FUNCTION TEST	CASE(Mean±SD)	CONTROL (Mean±SD)
FVC	2.84±0.72	2.9±0.57
FEV1	2.24±0.69	2.25±0.5
FEV1/FVC	0.73±0.11	0.85±0.08
FEF25%-75%	2.62±0.72	3.42±0.7

The mean of the forced Vital Capacities of the cases and controls were analysed and no significant difference (p value 0.63) was found. There was no significant difference in FEV1 values between the cases and the controls (p value 0.036). Analysis of the FEV1/FVC ratio of the cases showed a significant decrease compared to the controls (p value <0.005). There was also a significant decrease in FEF 25-75% among the cases (P value <0.005).

The cases were divided into 3 groups depending on the number of years as a rubber worker to analyse if any correlation between FVC and the duration of exposure existed.

Table 2 Group wise distribution of the cases as per the number of years as a rubber worker along with their respective mean FVC values and FEV1/FVC values.

Years	Number	Mean FVC	FEV1/FVC Mean
Group I (Less than 10 years)	7	2.83	0.734
Group II (11-20 Years)	20	2.71	0.82
Group III (> 21Years)	23	2.96	0.73

The statistical significance of the 3 means of FVC were tested using Anova and was found not to be significant (P value- 0.54).The means of FEV1/FVC were also tested using Anova and was found to be not significant(P value: 0.53). No co-relation was found between FVC and duration of exposure (P value >0.05). Among the study group, 9 had normal FEV1/FVC, while 41 had abnormal FEV1/FVC values.

Table 3 Distribution of cases as per FEV1/FVC values

FEV1/FVC	Cases	Control
Normal	9	35
Abnormal	41	15

Analysis of FEV1/FVC values of the cases using the Chi-square test showed a significant change (p value: <0.005; Odd's ratio: 17.11). This shows that the rubber workers have increased risk of developing obstructive airway disease.

Table 4 FEV1/FVC as per the Group wise distribution

	Normal	Abnormal	Total
Group I	2	5	7
Group II	2	18	20
Group III	2	21	23

The analysis of the FEV1/FVC values showed no significant change (P value: 0.041) within the 3 groups. The co-relation between FEV1/FVC and the number of years as a rubber worker was analyzed and was found

to be not significant(P value: >0.05) indicating that the obstructive airway disease did not become worse with increasing years of exposure .

Table 5: FEF 25-75% of the cases and controls

	CASE	CONTROL
Normal	37	50
Abnormal	13	0

The FEF 25-75% values (Table 5)showed 26% of the cases to have abnormal values and were statistically significant (P value: <0.0001). No co-relation was found between FEF 25-75% and the duration of exposure (P value: > 0.05).

DISCUSSION

Of the total cases, 46% had more than 20 years of experience as a rubber worker. The mean FVC values of subjects and controls did not show any significant difference. The cases were divided into 3 groups depending on the number of years as rubber workers. Among the groups, no correlation was found between FVC and duration of exposure. The mean values for FEV1/FVC for cases and controls were also calculated and it showed a significant decrease among the cases. The mean values for FEF25-75% were also calculated for cases and controls and it showed a significant decrease in the values among the cases.

In our study we observed obstructive airway disorders in 80% of the cases. In comparison with the study done by Governa et al, it was noted that no evidence of chronic obstructive pulmonary disease was found and in most cases no significant decline in FEV1 was observed [1]. Zuskin et al had conducted a similar study among rubber workers. Their results showed a significantly higher prevalence of all chronic respiratory symptoms except asthma in rubber workers [3]. In another study by FineLJ, there was significant decrease in FEV1/FVC ratio in rubber workers with more than ten years of exposure [4]. Williams et al showed that air-borne rubber particles if inhaled, aggravated the latex sensitization, irritated the respiratory tract and induced asthma [5]. A study conducted by Gopathy Sridevi etal showed that impact on the pulmonary function was dependent on duration of exposure -less in short time-exposure and more in long time-exposure.[6] Use of acids for the coagulation of the latex may cause various inflammation

and lung function abnormalities (Danwanichakul *et al.*, 2011)[6].In a study conducted by V.Devender Redy etal a borderline significant decrease in FVC and FEV1 was observed in workers group compared with controls (p=0.05) and a positive correlation was observed with increase in working years and decrease in the FEV1. A statistical significant decrease in FVC, FEV1 and FEV1/FVC was also observed with increase in BMI among rubber tappers (r=0.89, p<0.000), reflecting the increased restrictive pattern in these patients. A statistically significant difference was observed in FEV1/FVC as duration (years) of tapping) increased[7]. In our study the cases who were exposed to latex, smoke and chemicals had an abnormal FEV1/FVC. However it was not statistically significant. Duration of exposure to chemicals, smoke and latex did not have any effects on the pulmonary function of our cases. The reason for these may be attributed to the small sample size of our study. Another reason being that the past history of smoking in these patients was not enquired into and so they may already be having an underlying undiagnosed obstructive airway disease. A reduction in FEF 25-75% was noted in 26% of the rubber workers who were tested indicating a small airway disease. This however was not found to have any co-relation with duration of exposure to latex, chemicals or smoke.

CONCLUSIONS

A statistically significant reduction was seen in the FEV1/FVC values among 80% of the rubber workers . A similar reduction was seen in the FEF 25-75% values among 26% of the rubber workers. No co-relation was seen between the FEV1/FVC, the duration of exposure and the type of exposure to the various pollutants that were studied. No co-relation was seen between the FEF 25-75% with the duration of exposure and the type of exposure to the various pollutants that were studied. FEV1/FVC was low in 80% of the workers indicating obstructive airway disease. The cases who were exposed to latex, smoke and chemicals had an abnormal FEV1/ FVC, however it was not statistically significant. Duration of exposure to chemicals, smoke and latex did not have any effects on the pulmonary function of our cases, the probable reason for this being a small sample size of our study. Thus studies involving a larger cohort would be needed to reason the cause of the obstructive airway disease.

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Prevalence and Causes of Stress in Newly Joined Medical and Dental Students Varies with Gender

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ABSTRACT

BACKGROUND: Acute stress is positive and enables a person to perform better but the chronic form is the silent killer. No one is shielded from stress but the stress in medical and dental students has increased by leaps and bounds, and the factors for it are different at different stages of this profession **AIM AND OBJECTIVES:** To determine the prevalence and causes of stress in newly joined medical and dental students and their gender variations .**MATERIAL AND METHOD:** Cohen's perceived stress test to assess the prevalence of stress was used and the self-drafted questionnaire to assess the factors of stress was filled. **RESULTS:** 92.8 % of students were under moderate or high stress, and it is observed that Psychosocial stressors were the major cause compared to academic and health stressors and it was observed that the female students were affected significantly and the P value was < 0.01. **CONCLUSION:** Interventions like counseling, yoga and meditation can be included to reduce the deleterious effect of stress and these can be gender based.

Keywords: *newly joined medical students; psychosocial stress; gender.*

INTRODUCTION

One of the common causes of stress in young adult is joining of a graduation course, which is a major change in personal as well as professional life of an individual and it brings along with it multitude of variance in one's lifeline like : migration, separation from comforts of family, increased personal responsibilities, academic and peer pressure and not to forget the unfairness of life. With recent advances in medical science the first year students have to master a lot of knowledge in a short span of time and all these together, leads to stress in the life of newly joined medical and dental students.

Walter B.Cannon coined the term homeostasis to describe the steady state of internal environment of the body, the physiological equilibrium. In contrast to this Mc.Ewen used the term allostasis, referring to body's ability to adapt to changing environment and set a new equilibrium, which is beneficial for survival. During stress a person initially adapts to change which can be called allostasis but with time if stress persists it becomes allostatic load and further allostatic overload , which is exaggerated physiological or pathological response. This stress is responded physiologically in our body by hormonal and in-turn behavioural changes. Stress for a short while enhances our performance but once it is prolonged it leads to decrease in the resources to cope, leading to a response by the body in the form of anxiety, immunosupression, eating disorders, hormonal imbalance like decreased dopamine and endorphins causing decreased threshold to pain, decreased cognition and reduced pleasure in previously enjoyed activities.

Stress in psychology is defined as a feeling of strain and pressure. Stress response to occur in humans, we must first have interpreted a situation as being either novel, unpredictable, as one that threatens our ego or sense of self or decreases our sense of control. These stressors are perceived differently by a XX and a XY chromosomal carrier and their responses also varies to a major extent. The physiological variations of hormones in male and females naturally influences and explains the differences in their behavior. The interaction of sex

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hormones with stress hormones produces differences in the perception of stress. A man having a SRY gene has more of norepinephrine while a woman who has estrogen which produces more of endorphins in response to stress, so the stress is perceived differently.

Previous studies in undergraduates have shown that academic performances are the greater stressors, more so in the female students.[1] But in our study we pinpoint the determinants of stress in the early 1 month of joining the graduation course where the causes are more psychosocial as compared to the academic and health stressors of later half of the course .

As they enter an unexplored, unknown and less predictable way of life which brings along with it hidden stressors, it would be wise to detect, create awareness and device steps to address them so that it would not hinder their future performance in academic, social and psychological arenas of life. As they have a long way to go in the choosen profession and face the realities and consequences of their "choice" there is a need to know the different factors causing agony in their young minds so as the institution as well as the parents can support them effectively.

MATERIALS AND METHOD

The study was conducted on a total of randomly selected 200 newly joined medical and dental students in the month of August- September 2017 at Dr. B.R.Ambedkar Medical college , a prestigious private medical college situated at Bangalore, Karnataka. Complete anonymity was maintained while administering the questionnaire.

INCLUSION CRITERIA

A group of apparently healthy students in the age group of 19-20 years who have recently joined their graduation course were included.

EXCLUSION CRITERIA

The students having a major physical or mental health problems like epilepsy, asthma, students who were differently abled, or ones on any continued medication or who had suffered a recent demise of a family member were excluded from the study.

No student had exam in the following 3 months.

Informed explained consent was taken before conducting the study. The students were asked to fill the questionnaire quickly so as prevent subject bias.

Subjects Personal data was taken and they were asked to fill 2 sets of questionnaire:

Firstly, To assess the stress levels :- By Cohen's Perceived Stress Test, which is the standard internationally accepted stress scale.

Students who had average stress were not included for the further analysis as it is a physiological condition.

Secondly, To know the stress inducing factors a carefully drafted 30 items pre-structured and pretested questionnaire was prepared, in which the common stressors were divided into 3 groups as a) academics b) psychosocial and c) health aspects of life . Academic factors like vastness of course, language barrier, assignment burden, peer pressure were included. Health factors major concerns were quality of food and hygiene, change of weather, physical tiredness, sleep difficulties. While psychosocial issues were difficulty in finding friends, social media botherance, self presentation, financial constraints and time management. Each question was scaled as 0(never), 1(rarely), 2(sometimes), 3(frequently), 4(always).

After data collection, Mean and Standard Deviation for different stress factors was achieved and gender variation was compared using student t' test.

FINDINGS

Out of 200 newly joined students, 180 participated in the study in which 58 were males and 122 were females.

Table 1: Cohen's Perceived Stress test

Sample size (n)	Average stress	Moderate Stress	High Stress
180 (100%)	13 (7.2%)	60 (33.3%)	107 (59.5%)

From the results obtained by Cohen's Perceived Stress test (table 1) the distribution of stress levels among students was 7.2% average stress, 33.3% moderately stressed and 59.5% highly stressed.

Table 2: Gender wise distribution of stress

Gender (180)	Average stressed (13)	Moderately Stressed (60)	High Stress (107)
Male (58)	05 (8.6%)	21 (36.2%)	32 (55.2%)
Female (122)	08 (6.5%)	39 (32.0%)	75 (61.5%)

From table 2 the prevalence of moderate and high stress levels is 93% in females and 91.4% in males.

Observation from Second Set of Questionnaire for **stress factors** in moderately and highly stressed students was as follows :-

Table 3: Major causes of stress

Sl.No	Subgroups of Stress Factors	Mean Scores(n=167) (Mean ± SD)
1	Academic	12.91 ± 0.81
2	Psychosocial	15.68 ± 0.67*
3	Health	10.41 ± 0.49

*Psychosocial factors shows highest mean value.

Table 4: Comparison of major causes for stress among gender

Subgroups of Stress Factors	Male(n=53) (Mean ± SD)	Female(n=114) (Mean ± SD)	*P*-Value
Academic	12.84 ± 0.79	12.94 ± 0.81	0.916
Psychosocial	15.18 ± 0.39	15.91 ± 0.65	0.009*
Health	10.43 ± 0.50	10.40 ± 0.49	0.495

*$P < 0.01$, Highly Significant

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS software and paired t' test results revealed that the psychosocial stress had highest mean value (15.68 ± 0.67).

paired t' test for gender variation of psychosocial stress factor showed $p < 0.01$.

RESULTS

92.8 % of students were under stress, and it is observed that Psychosocial stressors were the major cause compared to academic and health stressors.

Compared to males, female students were affected significantly and the p-value was < 0.01 which is highly significant.

DISCUSSION

In our study we are trying to assess the prevalence of stress in newly joined medical and dental students and we observed that 92.8% students were moderately or highly stressed. Out of the totally stressed students 7.2% were average , 33.3% were moderately , and 59.4% were highly stressed. The psychosocial factors of stress (mean=15.68±0.67) was found to be dominant over the academic and health causes. Our study also highlighted that psychosocial stress affected female

students significantly compared to males. The common psychosocial factors were, loneliness and difficulty in planning work schedules. Our study results coincides with a similar study conducted by Hamza M. Abdulghani et al. on medical students which concluded that the level of psychosocial stress was higher in female students as compared to males, they have also concluded that newly joined students are under higher stress.[2] In another study conducted by A.N. Supe on medical students at Mumbai has concluded that stress in medical students is common and is process oriented , he found emotional factors are greater perceived cause of stress in 1st MBBS and stress depends on personal way of coping strategy and social support.[3]

Stress and health care personnel's is synonymous, but now it has to be acknowledged and reduced because the mental health of these budding doctors will reflect heavily on their future patient care. The mean was highest for psychosocial stressors. Psychosocial factors of stress dominated in the initial few days because 1)Lack of previous experience of self management regarding time and money 2) Indian system promotes spoon feeding, cocooning and inhibits and binds us from independent decision making 3) According to Eric Erikson's stages of psychosocial development, psychosocial crisis like identity, intimacy and isolation surfaces in young adults which has to be taken care of [4]   4) Academic factors starts contributing later .

Many studies have been done to assess the factors causing stress in medical students , and have concluded that the academic factors are the main determinants of stress but our study concluded that the psychosocial factors are the most important ones in the freshly joined students but academic factors are the determinants for the later-half of the profession which is highlighted by Anandhalakshmi Swaminathan et al. who conducted the study after 6 months of joining the course and concluded that the vast majority of students perceived moderate stress and analysis highlighted a greater association with academic factors compounded by psychosocial ones.[5] Again a study done by Ranadip Chowdhury concluded that the determinants of stress in undergraduates is mainly academic like vastness of syllabus, performance in practicals, clinical postings etc.[6] Another study by Sahana Madhyastha et al. has concluded that academic performance and professional identity issues were of greatest concerns in third year medical students.[7]

We also found that prevalence of stress was higher in females (93%) as compared to males (91.4%) which is in consistent with the results obtained by Hamza M Abdulghani et al. as well as study done by M. Pilar Matud who suggested that women suffer more stress than men.[2,8] Female sex hormone attenuates sympathoadrenal and HPA response so there is sluggish cortisol feedback on brain leading to reduced containment of stress response and they feel more psychologically affected. Also, this difference in perceiving and processing of the same stressors can be explained because of the differences in the development of male and female from the fetal life ie; male brain is exposed to testosterone and estrogen produced by the testis, which will facilitate and suppress the brain cell production in different areas, whereas the female brain is not exposed to estrogen as the fetal ovaries do not produce any hormones and so the reverse happens during development of brain.[9] Subsequently, after birth the psychological development of a male and a female differ because of society and gender roles.

Added to the initial psychological stress , the students will be exposed to multiple stressors like academic , health and physical which will lead to chronic stress acting as an allostatic load, which in-turn will lead to increased cortisol , increased sympathetic activity etc. on the body, which has multiple adverse effects like reduced cognition , altered metabolism , cardiovascular morbidity, supressed immunity and altered A.N.S function .This manifests as decrease in performance, development of habits (addictions), obesity, anxiety (depression) and vulnerability to ill-health. Eunice .Y .Yuen et al. has concluded that repeated stress causes cognitive impairment by suppressing glutamate (major excitatory neurotransmitter) receptors expression and function in prefrontal cortex.[10]

In a study by Ajay T Shendarkar and Vijay Patil has suggested that child rearing was found to be playing an important role in dealing stressors and family support can be an effective tool for helping medical students.[11]

Because of such varied ramifications, stress has to be nipped in the initial stages by various interventions designed for males and females separately by the institution, authority and mentors by active participation and discussion. Helping women to achieve a greater sense of control over their circumstances would definitely enhance their performance.

CONCLUSION

In our study we found that 92.8% of newly joined medical students were under stress and higher percentage of female students were affected. The major cause of stress was psychosocial stress . We have to acknowledge that stress exists in all fields and to ensure that students are aware of initial symptoms of stress and also of the assistance programs like meditation, yoga, counseling , sports and exercise that are available to them .

Conflict of Interest: Nil

Source of Funding – Self

Ethical Clearance – Ethical clearance was obtained from the Institution Ethics Committee of Dr. B. R. Ambedkar Medical College and Hospital.

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Correlation of Body Mass Index and Waist Hip Ratio with Cardiovascular Parameters in Sedentary Males

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ABSTRACT

Background:- There is an excess of adipose tissue accumulation in obesity which is associated with more sympathetic activity resulting major potential mechanism contributing to increased risk of cardiovascular complications. Obesity is associated with coronary arterial diseases, type-2 diabetes mellitus, infertility, osteoarthritis, and colo-rectal cancers. Visceral fat is more atherogenic.

Method:-100 sedentary healthy male subjects selected randomly in the general population of Davangere city. Anthropometric parameters like weight, height, waist and hip circumference were measured. With these, Body Mass Index (BMI), Waist Hip Ratio (WHR) were calculated. Correlation between BMI and WHR with cardiovascular parameters was made.

Results:-There was statistically significant increase in body mass index, waist hip ratio, blood pressure and pulse rate was seen and there was positive correlation between body mass index, waist hip ratio with blood pressure and pulse rate in sedentary subjects.

Conclusion:-Sedentary life style and obesity are associated with increase in body mass index, waist hip ratio, blood pressure and pulse rate. There is a positive correlation between Body Mass Index, Waist Hip Ratio with Pulse Rate, Systolic and Diastolic Blood Pressure.

Keywords: Blood pressure; Sedentary lifestyle; Waist-Hip Ratio

INTRODUCTION

Obesity can be defined as a state of excess adipose tissue mass.[1] Over weight and obesity are classified by Body Mass Index (BMI) (weight in kilogram/square of the height in meter). In adults, overweight is defined as BMI of 25.0 to 29.9kg/m²; obesity is defined as BMI $\geq$ 30kg/ m².

Physical activity may be a critical target for the specific prevention of visceral fat accumulation and corresponding health risk in obese subjects.[3] Visceral fat is more metabolically active than subcutaneous fat and hence may be more deleterious to health .[4]

Avoiding a sedentary lifestyle during adulthood not only prevents cardiovascular disease independent of other risk factors but also substantially expands the total life expectancy and the cardiovascular disease-free life expectancy for men and women.[5] Body fat, 25% for men and 33% for women are suitable cut off threshold for defining obesity.[6]

Body Mass Index (BMI) has extremely high specificity but lower sensitivity compared to other tests for estimating fat content of the body. Ideal body weight is defined as a BMI of 18.5 to 24.9 kg/m². Overweight is defined >25 to 29.9 kg/m² and obesity is defined as BMI > 30 kg/m².[7]

Those who remain or become inactive are usually heavier than those who are physically active.[8] Within

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a permissive environment, the more common genetic factors involved in obesity regulate the distribution of body fat, the metabolic rate with its response to exercise and diet, the control of feeding and food preferences.[9]

WHO has recommended body mass index (BMI) as a useful measure of obesity, which is calculated as weight (kg) divided by height (m^2). BMI value of 25 and above indicates overweight, 30 and above indicates obesity.[10] There is increased risk of metabolic complications for men with waist circumference $\geq$ 102 cms and women with a waist circumference $\geq$ 88 cms .[11]

AIM AND OBJECTIVE OF THE STUDY

To correlate body mass index and waist-hip ratio with cardiovascular parameters in sedentary male subjects

METHODOLOGY

Present study was conducted in the department of Physiology, JJMMedical college, Davangere after taking Institutional Review Board permission.The study was undertaken to correlate BMI and WHR with cardiovascular parameters in100 healthy sedentary male subjects in the age group of 25 - 55 years. Males with BMI $\geq$30 (kg/m^2) were classified as obese.

Exclusion criteria in this study were

Subjects suffering from endocrine disorders

Hypertensive individuals

Subjects with renovascular and cardiovascular diseases.

All the subjects gave consent after explaining the procedure of the non-invasive technique to them. A brief personal history, childhood obesity, detailed history of exercise and a clinical examination of all the systems were done to exclude medical problems and to prevent confounding of results.

Statistical analysis: Correlation analysis was done for assessing relationship between anthropometric and cardiovascular parameters by Pearson's correlation coefficient.

A p-value of 0.05 or less was considered as statistical significant.

Physical anthropometry.

The circumference technique measures body shape using a flexible plastic measuring

tape, subjects were required to wear minimal thin cloth, the measurement is typically

conducted in the morning before eating and after emptying the bladder. Subjects were

measured in standing position and they were asked to breathe normally and gently which

prevents the subject from contracting their abdominal muscles.

Height:- Was measured by a plastic measuring tape after marking the subject to stand straight against an even wall. A sliding wooden head piece was used for accurate work.[12]

Body weight:- Was measured by using standardized weighing machine,

which was calibrated in kilograms.

Body mass index (BMI):- Was derived by Quetlet's index from body weight (kg)/Height (m^2).[13]

Waist Circumference (WC) :- Was measured to the nearest centimeter with a plastic

Measuring tape while the subjects were in the standing position at the end of gentle expiration. The following anatomical landmarks were used: laterally, midway between the lowest portion of the rib cage and iliac crest, and anteriorly midway between the xiphoid process of the sternum and the umbilicus.[14]

Hip Circumference (HC):- Was measured in centimeters(cms)in standing position with a plastic tape at the largest horizontal circumference around the buttocks.[15]

After completing the measurements, the waist circumference was divided by the hip

circumference to determine the waist to Hip ratio(WHR)

RESULTS

Positive correlation between Body Mass Index, Waist Hip Ratio with Pulse rate, Systolic and Diastolic

Blood Pressure in sedentary males(Table.2)

Table 1. Mean BMI, WHR, and Cardiovascular parameters

Parameters	Mean ± SD
Age (yrs)	35.56 ± 9.2
BMI (kg/m²)	28.2 ± 5.5
WHR	0.96 ± 0.05
Pulse rate (beats/min)	82.8 ± 5.4
SBP (mm Hg)	132.8 ± 8.2
DBP (mm Hg)	87.5 ± 6.1

Table 2. Correlation between BMI, WHR with cardiovascular parameters

Correlation	r value	p value
BMI α SBP	+ 0.58	< 0.001, HS
BMI α DBP	+ 0.52	< 0.001, HS
BMI α PR	+ 0.38	< 0.05, S
WHR α SBP	+ 0.34	< 0.05, S
WHR α SBP	+ 0.31	< 0.05, S
WHR α SBP	+ 0.33	< 0.05, S

HS- Highly Significant, S- Significant

DISCUSSION

Recent studies shown that adolescents and adults have significant relationship between physical inactivity and other adverse health practices, such as consumption of less-healthy foods or increased fat intake. Inactive people tends to consume more quantities of dietary fat. These data suggest that inactivity tends to cluster with other health behaviors that have adverse effect on amount and distribution of body fat deposition which results in obesity.[16] Modern life style associated with easy avail of food, lack of physical exercise, sedentary life style, calories dense food, and excessive television viewing are among the identified contributes to the obesity epidemics.[17]

It states that excess catecholamine triggers various adverse processes, which if persist, can lead or aggravate hypertension and insulin resistance. Visceral fat but not peripheral fat was correlated with atherogenic effect.[18] Heart rate increases with increase in amount of body fat. A 10% increase in body weight causes a decline in parasympathetic tone accompanied by a rise in Mean heart rate and conversely, heart rate declines during weight reduction. This is important because increased heart rate is associated with increased mortality rates.[19]

Physical inactivity decreases the production of Nitric Oxide (NO) by the abnormal endothelium, which leads to changes in blood vessel diameter and structural changes which results in hypertension.[20] Increase in blood pressure is more when the obesity is of abdominal distribution. Factors linking obesity to increase in blood pressure include ; Direct effects of obesity on hemodynamics;Mechanism linking obesity and an increase in peripheral vascular resistance: endothelial dysfunction, insulin resistance, sympathetic nervous over activity, substances released from adipocytes (IL-6, TNF-α).[21] Obesity is associated with higher circulating levels of insulin (a consequence of insulin resistance) and consequently with enhanced renal retention of sodium, resulting in increased blood pressure. [22]

Excess of adipose tissue augments cardiac output, stroke volume, left ventricular filling pressure and expands intravascular volume. There is increased prevalence of high blood pressure associated with obesity results from a discrepancy between raised cardiac output and a relatively normal arterial capacity.[23]

CONCLUSION

The conclusions of our study were:

There was a positive correlation between Body Mass Index, Waist Hip Ratio with Pulse rate, Systolic and Diastolic Blood Pressure in sedentary males.

Further research is recommended to understand how genes and gene-environment interaction leads to changes in sedentary life. A better understanding of ethnic/racial differences in the development and progression of various complications in sedentary lifestyle is needed. Hormonal assay and lipid profile estimation along with fat parameters would have given a better understanding about sedentary life style and its consequences. We need to evaluate the strategies and efficacy of physical

activity in various diseases. Those who are sedentary, an exercise program are an excellent way to significantly improve their health. Maintaining a healthy lifestyle, including exercise, will result in increased energy levels throughout working period. The benefits of regular physical activity are numerous, people who exercise live longer and healthier.

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Levels of Circulating Monocytes-An Indicator for Cardiovascular Complications in Type 2 Diabetes

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ABSTRACT

Background: Type 2 diabetes mellitus is mainly characterized by the development of cardiovascular complications.Inflammation is said to be involved in initiation and progression of diabetic complications related to cell damage of tissues and deepening of metabolic disturbances. Monocyte derived macrophages are believed to play a vital role in the initiation and progression of atheroma formation since monocytes grown in the presence of high glucose concentrations are in an activated and inflammatory state which is associated with the release of superoxides which has a role in oxidative stress. Studies suggest monocytes from patients with diabetes mellitus has a role in the generation of cardiovascular complications associated with diabetes. Also studies done on experimental animals suggest that depletion of monocytes and their progeny lowers the development of atherosclerosis.Thus the present study was an attempt to compare the level of circulating monocytes of diabetic subjects with cardiovascular complications with those without cardiovascular complications

Materials and Method: After taking written informed consent from the participants,under aseptic precautions around 3ml of blood was drawn using vacutainer and the levels of circulating monocytes were determined under aseptic precautions with the help of an instrument Sysmex-XS1000i. **Results and Conclusion**: The results revealed that the circulating monocyte levels are significantly increased in diabetics with cardiovascular complications (p=0.04) compared to diabetics without cardiovascular complications. In support of previous studies our study opens the possibility that peripheral blood monocytes can be used to investigate the pathophysiology of diabetic complications. In the light of present idea, more studies on surface markers expressed by monocytes may be required for future risk stratification and disease-monitoring, based on knowledge of human monocyte biology .

Keywords: Type 2 Diabetes, Cardiovascular complications, Monocyte count.

INTRODUCTION

Type 2 diabetes mellitus is mainly characterized by the development of cardiovascular complications. The risk of cardiovascular disease mortality in type 2 diabetic patients is more than double when compared with age matched controls. Monocyte derived macrophages are believed to play a vital role in the initiation and progression of atheroma formation

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leading to cardiovascular complications. [1] Monocytes, as representatives of the innate immune system, play a major role in the initiation, propagation, and progression of atherosclerosis from a stable to an unstable state. The differentiation state of macrophages is directly related to macrophage metabolism of lipoproteins and cholesterol and consequently foam cell formation. [2] Progression of atherosclerosis relates to accumulation of macrophages, alteration of endothelial cell function, phenotypic modulation of smooth muscle cell, and neovascularization of the plaque tissue. [3,4]An important initial event in the pathogenesis of atherosclerosis is the adhesion of circulating monocytes to arterial endothelial

cells, followed by their transmigration into the sub endothelial space along the chemotactic gradient. [5]

Monocytes entering the endothelial space in response to chemotactic factors, proliferate and differentiate into intimal macrophages, which accumulate in the artery wall in diabetes. [6] Glycoxidation reactions are thought to contribute to macrovascular disease in diabetes by damaging tissues in the local microenvironment of the arterial wall. [7]Hyper glycemia enhances monocyte adhesion to cultured aortic endothelial cells.[8] Monocyte adhesion increases the expression of several inflammatory genes, including adhesion molecules that promote monocyte adhesion to the endothelial cells.[9]

Glucose-mediated and AGE (advance glycation end products)-mediated inhibition of nitric oxide production by endothelial cells is associated with impaired endothelial-dependent relaxation.[10] an early marker of vascular injury .Hyperglycaemia and AGEs stimulate the production of superoxide by endothelial cells, partly by activation of NADPH oxidase,[11]thereby providing a link between hyperglycaemia, AGEs, and oxidative stress. Expression of adhesion molecules might result from impaired nitric oxide production.[12] Both high glucose concentrations and AGEs are associated with an increased state of activation of circulating monocytes in vitro and in vivo. Monocytes grown in the presence of high glucose concentrations or isolated from individuals with poorly controlled diabetes are in an activated and inflammatory state which is associated with the release of superoxides which has a role in oxidative stress and one of the factor responsible for this is NADPH generation by monocyte derived macrophages.[12] Studies suggest monocytes from patients with diabetes mellitus produce higher levels of TNF-α and IL-8 in comparison to monocytes of normal individuals and this TNF-α production is thought to play a role in the generation of cardiovascular complications associated with diabetes[11]. Though articles suggest that diabetes alter the circulating monocyte populations[13-15], the relationship between these changes and the presence of diabetic complications has not been investigated. Studies done on experimental animals suggest that depletion of monocytes and their progeny has shown decrease in the development of atherosclerosis.[16]Thus the present study is undertaken to evaluate whether the level of circulating monocytes predict the development of cardiovascular complications in type 2 diabetic individuals.

MATERIALS AND METHOD

From the previous related article with the mean of 10.1 and 8.1, standard deviation of 2.1 and 2.9 and power of 80%, the required sample size is 26.For sample attrition few samples have been added and rounded of 30 in each group. Accordingly 30 diabetic individuals with cardiovascular complications and 30 diabetic individuals without cardiovascular complications aged between 40 -70 yrs with duration of illness between 2-10yrs attending diabetic outpatient department as well as those admitted in medical ward at PES Institute of Medical Science and Research, Kuppam were included for the study. Obese individuals,smokers ,individuals manifesting symptoms of chronic infections and inflammatory conditions associated with monocytosis ,individuals on ACTH therapy,individuals with abnormal lipid profile ,individuals with hematopoietic disorders associated with monocytosis ,individuals with autoimmune disorders associated with monocytosis,individuals with other complications of diabetes were excluded from the study.After obtaining ethical clearance from PES Institute of Medical Science and Research, Kuppam. All study participants were explained about the procedure and written informed consent was taken. A detailed health status assessment was done for all the subjects included in the study through history taking and clinical examination to rule out other systemic abnormalities. Under aseptic precautions around 3ml of blood was drawn using vacutainer and differential leucoyte count was performed using an instrument Sysmex-XS1000i at the central laboratory of the hospital.

RESULTS

The results were expressed as Mean ± SD and analyzed using Student's unpaired t-test for comparison of means. 'P' value of less than 0.05 was considered significant.

Table 1: Monocyte count in diabetes with cardiovascular complications and diabetes without cardiovascular complications of baseline characteristics

	Diabeteswith complications	Diabetes without complications	P Value
Monocyte count	7.88 ±1.61	6.92± 1.71	0.046*

*significant

DISCUSSION

Chronic subclinical inflammation has been recognized to play a crucial role in both initiation and progression not only of type 2 diabetes but also cardiovascular diseases .Metabolic disturbances related to diabetes and hyperlipidemia stimulate subclinical inflammation and production of many proinflammatory factors, which in turn possess the ability to worsen metabolic control. Therefore, it seems to be a vicious circle of disturbances .[17]Inflammation plays a central role in the development of diabetic complications, and macrophages in the tissue are considered to be an important cell type in this regard. Evidence ranging from pathological studies in people to in-vivo mouse models has established the role of inflammatory cells and inflammatory mechanisms in the pathogenesis of atherosclerosis. [18] Inflammation is implicated in the pathogenesis of type 2 diabetes and atherosclerosis.[19,20] The numerous biochemical and metabolic pathways postulated to have a causal role in the pathogenesis of diabetic vascular disease include effect of increased reductive or oxidative stress to the cell and activation of numerous protein kinase pathways, particularly protein kinase C and mitogen-activated protein kinases, that induces growth factor expression. [1] Collateral vessel formation termed arteriogenesis usually follows severe atherosclerosis. Recent studies showed that arteriogenesis requires active migration of peripheral monocytes to the site of ischemia and interaction with epithelium of the arteriole .[21] and migration of monocytes is mediated through the action of VEGF(Vascular endothelial growth factor) and its receptor Flt-1(fms related tyrosine kinase 1).[22]The mechanism responsible for the increased monocyte count could be stimulation of myeloid differentiation from human bone marrow by leptin.[23] Data from research show that leukocytes play an important role in inflammatory mechanisms independent of infection. [24] The earliest finding in the pathogenesis of atherosclerotic lesions is impaired endothelial function, which is tightly linked to insulin resistance and insulin-stimulated increase in leg glucose disposal and blood flow were coupled in a dose-dependent manner. [25] The vasodilatory action of insulin is dependent on nitric oxide (NO) generation. [26]Metabolic insulin resistance is characterized by pathway specific impairment in Phospho ionosotide 3-kinase– dependent signaling induced by proinflammatory cytokines which in the endothelium may cause imbalance between production of NO and glucose uptake, resulting in insulin resistance and endothelial dysfunction. Hyperglycemia inhibits production of NO, leads to elevated free fatty acids levels due to impairment in insulin's antilipolytic effect, and increases the production of reactive oxygen species, contributing to the reduction of NO synthesis .[27] The findings of the present study reveals higher monocyte count among diabetic patients with cardiovascular complications compared to those without cardiovascular complications . This may indicate a more sensitive predictivevalue for heteroaggregates than inflammatory markers.

The findings of the present study is in close agreement with the findings of Khurram Nasir which showed an independent association between monocyte count and peripheral arterial disease. [28] and Janciauskiene, S et al. which suggest a direct molecular link, mediated by C-36 peptide of Antitrypsin between inflammation and the oxidation and accumulation of lipid in monocyte-derived macrophages,an important factor for understanding of the events conducing to atherogenesis.[29] The present study is also in agreement with Mohammad Madjid etal and Afiune Neto Abrahao etal, whose findings suggest monocytes to be an independent risk marker for coronary artery disease.[30,31]

Apart from being one of the most important component of the inflammatory process in the atherosclerosis plaque ,Monocytes are also characterized high trafficking ability wherein the monocytes traverse from the circulation into areas of injury/inflammation which may presumely fail leading to a disease state, with atherosclerosis being an example. [32] Emerging evidence suggests that blood monocytes possess the potential to differentiate into dendritic cells with different functions in vivo during infection and inflammatory reactions.[33]

CONCLUSION

Our findings underline the important role of monocytes in the activation and development of low-grade inflammation.The findings are consistent with current evidence regarding the association of inflammatory markers, including WBC count, with the development of diabetic microvascular and macrovascular complications.[34] Although the present study suggests that monocytes are associated with a considerable increase in cardiovascular risk and opens the possibility of peripheral blood monocytes

for investigating the pathophysiology of diabetic complications, further studies are required before monocyte analysis is used as a routine diagnostic tool for predicting cardiovascular risk in clinics and hospitals . For this reason and in the light of our data presented here, more studies of monocytes in humans and studies to further examine each of cell surface markers expressed by monocytes indicative of their inflammatory and activation status responsible for diabetic complications are crucial for future risk stratification and disease-monitoring, based on knowledge of human monocyte biology.

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Effect of Exercise on Auditory and Visual Reaction Time in Healthy Young Adults

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ABSTRACT

Exercise provides multiple benefits to an individual. the beneficial effect of exercise on psychomotor performance is still subject of debate. This study was undertaken to determine the effect of short term exercise on auditory reaction time (ART) and visual reaction time (VRT). Fifty healthy subjects were included in the study , 25 of healthy male subjects who were not exercising forms (group I) and 25 healthy female subjects who did not perform any exercise forms (group II).

ART and VRT was recorded using digital display response time apparatus equipped with three lights (red, green and yellow) and three auditory stimuli (low, medium and high pitched sounds). The mean VRT of group II subjects (19.8 ±6.709) was significantly lower than that of group I (20.6 ±6.961) (P<0.001). The mean ART of group II subjects (31.9±5.160) was significantly lower than that of group I (32.9 ±5.950) (P<0.001). Auditory and visual reaction times was better in group II individual in both for forms of exercises.

Keywords : Auditory reaction time, visual reaction time, Isometric and isotonic exercise psychomotor

INTRODUCTION

Reaction time (RT) is an indicator of processing of sensory stimulus and its generation of motor response ,it is the time period between the onset of a stimulus and response[1]. Reaction time an important method used for central information processing speed and fast coordinated peripheral motor response. Reaction Time (RT) is a common method to evaluate psychomotor fitness, factors like type of stimulus and stimulus intensity, other factors like arousal, age, gender, fatigue, alcohol and exercise effect RT. literature indicate slow response with age and faster conduction of impulses in males as compared to females[2,3]. exercise has shown to enhance numerous aspects of mental functioning, such as mood, self-esteem and general psychological well being[4]. Studies have shown that physical exercises improve cognitive function and protect the cerebral function, these individuals are at a lower risk to develop mental disorders compared to individuals with sedentary life style[5].

Isotonic exercise also affects cognition and psychomotor function due to use of oxygen in a muscle's energy generating process. As this involves involve warming up followed by at least 10 minutes of exercise at an intensity of 70- 80% of maximum heart rate, ending with 5- 10 minutes of cooling down at an intensity of 50-60% of maximum heart rate[6]. The effect of exercise on visual and auditory RTs has escaped extensive examination and the existing data on the benefit of aerobic exercise on psychomotor performance is not conclusive Indian data on this subject is very limited .

Hence, this study was conducted to compare the reaction times for auditory and visual stimuli for isotonic and isometric exercise in exercisers and sedentary individuals

METHOD

This is a prospective cross sectional study was

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conducted on 50 subjects in the department of Physiology at Bhaskar Medical college . Subjects were divided in 2 groups consisting of 25 subjects each group. Group I included healthy male subjects who did not perform regular exercise; and group II included 25 female persons who did not performed regular

All these subjects were in age range of 20- 25 years. and group II included persons who performed regular aerobic exercise for minimum of thirty minutes per day with a frequency of three to five days per week for a minimum duration of three to six weeks. All these subjects were in age range of 20-50 years.

Inclusion criterion – non exercising healthy adults

Exclusion criterion - who were smokers and/or alcoholics, who had clinical evidence of any illness, who had abnormal vision or hearing and who was on any medication which affects cognitive performance were excluded from the study.

The study was approved by institutional ethics committee and written informed consent was obtained from all the subjects.

Study procedure

The subjects were instructed to come to exercise physiology lab and the initial baseline reading of ART and VRT was taken , then the subjects were asked to perform two types of exercises , isotonic using bicycle ergography for 5 minutes followed by ART and VRT recording , Isometric exercise was recorded using grip dynamometer till exhaustion followed by ART and VRT recording

ART and VRT were recorded using digital display response time apparatus (Model No. RTM 608Medicaid:Ambala, India). The apparatus is equipped with 3 light stimuli: red, green and yellow and 3 auditory stimuli; low, medium and high pitched sounds (14). All the subjects were thoroughly acquainted with the apparatus and three practice trials were given to every subject before taking the reading.

Visual reaction time (VRT)

Any one of the three stimuli for light i.e. red, green, and yellow light was presented randomly and the subject responded to above stimuli by pressing the knob of digital display apparatus by switching off the given colored light. Reaction time displayed on apparatus was recorded in milliseconds (msec). Three readings were recorded for each colour and the lowest of three readings was taken as the value for reaction time task for that color..

Auditory reaction time (ART)

The subject was presented randomly with one of the three sound stimuli (low, medium or high pitch) by the observer and subject responded by pressing the knob of digital display apparatus by turning off the produced sound. Reaction time displayed on apparatus was recorded in msec. Three readings were recorded for each sound stimulus and the lowest of the three readings was taken as the reaction time value for that stimulus.

Statistical analysis was done using analysis of variance (ANOVA). Data is represented as mean± SEM. Subgroup analysis was done for age and gender as earlier studies indicate alternation in VRT and ART with age and gender (2-4). $P<0.05$ was considered as statistically significant.

RESULTS

Table - I - Data comparing the Auditory Reaction time for different types of exercise in relation to gender

DATA	Group I(Males)			Group II (Females)		
	Baseline ART	Isometric ART	Isotonic ART	Baseline ART	Isometric ART	Isotonic ART
sum	37.3	31.9	24.7	38.9	32.9	28.97
Mean	1.49	1.27	0.98	1.55	1.3	1.15
SD	0.66	0.76	0.60	0.87	0.95	0.59
95% CI	0.19-2.79	0.26-2.77	0.18-2.16	0.69-3.8	0.55-3.19	0.50-2.33

SE	0.194
T value	1.49
P value	≤0.05

The ART values in Group I is lower in for all the three parameters when compared to the values of group II with significant P less than 0.05 , there is a very wide reduction in reaction time after Isotonic exercise in both group when compared with Isometric exercise in both the groups

Table-II - Data comparing the Visual Reaction time for different types of exercise in relation to gender

DATA	Group I(Males)			Group II (Females)		
	Baseline VRT	Isometric VRT	Isotonic VRT	Baseline VRT	Isometric VRT	Isotonic VRT
sum	21.1	20.6	13.8	21.4	16.6	19.8
Mean	0.84	0.82	0.55	0.85	0.66	0.79
SD	0.36	0.57	0.20	0.38	0.29	0.45
95% CI	0.22-1.56	0.29-1.94	0.15-0.95	0.10-1.60	0.08-1.24	0.10-1.69
SE	0.12					
T value	2.23					
P value	≤0.05					

The VRT values in Group II is lower in for all the three parameters when compared to the values of group I with significant P less than 0.05 , there is a very wide reduction in reaction time after Isotonic exercise in both group when compared with Isometric exercise in both the groups

The subgroup analysis also shows the faster VRT in females as compared to males and with increasing age in both groups, although statistically not significant. Similarly, both in the male and female sub-groups, group I subjects had significantly higher VRT values for all the three colors as compared to group II.

The subgroup analysis also shows the delayed VRT in females as compared to males and with increasing age in both groups, statistically not significant , The mean ART of subjects in group I was significantly higher than that of subjects in group II.

DISCUSSION

lack of physical activity has caused much concern in the youth as it causes low levels of fitness and increases incidence of various health related problems such as cardiovascular diseases. This causes greater physiological as well as psychological stress on the individual. It is already known that participating in regular exercise can prevent coronary heart disease, hypertension, obesity and improve flexibility. It improves mood and concentration and reduces stress. Individuals feel and do better as a result of engaging in some type of exercise program if continued for a number of weeks.

This study was designed to explore the relationship between physical fitness and psychomotor performance. ART and VRT were used to evaluate processing by central nervous system and coordination between sensory and motor functions. We observed that RT for auditory and visual stimuli was significantly lower in subjects who performed even a short term exercises, the positive effect of exercise on RT time have been reported previously[7,8,9] . In one study faster RTs for both auditory and visual stimuli were reported among exercisers compared to controls[9] . Another study reported that the fastest RTs were observed when the subjects were exercising sufficiently to produce a heart rate of 115 beats per minute[11]. Studies on older subjects had also reported the beneficial effects of exercise[15].

Our study findings indicate that using 30 minutes of regular exercises improved reaction time. The improvement was found irrespective of age and gender. There was a trend for faster reaction times in isotonic types of exercises when compared with isometric exercises , the reaction time was delayed in females

as reported earlier also[2,4]. Various mechanisms have been proposed for faster RT in aerobic exercisers. This may be due to improved concentration, alertness, better muscular co-ordination and improved performance in the speed and accuracy in males[13,14]. Isotonic exercise activity leads to enhanced cognitive performance, in particular cognitive flexibility, a measure of executive function[15]. Exercise training elicits an adaptive increase in mitochondrial content and respiratory capacity of those skeletal muscles which were being used during the exercise training leading to sparing of glycogen and increased capacity to oxidize fatty acid, thus prolongation in work time, delay in fatigue and increase in enzymatic activity, increasing oxidation of ketones and increased removal[17,18]. Another important mechanism by which exercise improves performance in aerobic exercisers is through its ability to improve neurological functioning by increasing blood circulation within the brain[19]. When more blood is allowed to flow through the brain, more nutrients, such as glucose and oxygen, are able to be delivered to important structures that influence an individual's cognitive functioning[6].

Frequent aerobic exercise plays a large role in the maintenance of cerebrovascular

Activity and cardio respiratory functioning, which can in turn help to sustain cognitive

Aptitude. Alterations in the level of certain neurotransmitters, such as serotonin, nor epinephrine and dopamine by physical exercise may play a key role in various aspects of cognitive functioning, such as enhancement of both working and long-term memory[20]. On the contrary, few studies have reported that exercise does not lead to a significant decrease in RT[1,11,12].

CONCLUSION

The faster RT in aerobic exercisers can serve as an important link to optimize the process of performance. As a competitive sport depends on mental processes and peripheral elements of the movement system, psychomotor fitness, due to Isotonic or Isometric exercises in strategies that involves attention and decision, thus reinforcing a good performance. This bridge can also help the elderly to prevent the effect of aging on cognition and multiple task performance .The use of physical exercise to improve cognitive function can be applicable as a cheap and non-pharmacological alternative to optimize process of performance in all age groups and genders.

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Study of Haematological and Cardiovascular Parameters in Relation to Blood Lead Levels in Spray Painters and Welders

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ABSTRACT

Background: Occupational exposure to lead is most common in preparation of lead containing paint, welding etc. Lead poisoning is one of the compensable diseases in India since 1924. causes negative effects particularly on nervous, cardiovascular, renal, hepatic and hematopoietic system.

Objective: To assess haematological and cardiovascular parameters in relation to blood lead levels in spray painters and welders.

Method and Material: Study group included 455 male painters and welders working in small industries for two to six years. Age and gender matched controls were selected. Study was carried out in the private laboratory in Bangalore. Blood lead levels (BLL), Haematological parameters like Red blood cell count(RBC),Haemoglobin concentration (Hb) ,Reticulocyte count, Blood indices were estimated using an auto analyzer and Blood pressure was recorded during their workshift.

Results: The mean BLL of study group was 1.988±0.312 μg/dL, compared to control group which was 1.77±0.2865 μg/dL (t= 16.82, p = 0. 612). Study group, showed 36 workers with high BLL (≥10 μg/dL). No correlation was found between anaemia and hypertension and BLL.

Conclusion: Mean of BLL in study group was not statistically significant compared to control group. Low lead exposure rates and efficient institutional and/or personal protective measures may be the reason behind this outcome.

Keywords: Blood lead level, Occupational exposure, Painters, Welders

INTRODUCTION

Lead is a   heavy metal used in more than 150 industrial sectors. Lead poisoning is one of the compensable diseases in India since 1924[1]. The use of lead-containing paints and leaded petrol has been accountable for a gradual accumulation of lead wastes in recent times, resulting in overall increase of lead absorption [2],[3] . Occupational exposure to lead is most commonly seen during lead mining and processing, preparation of lead containing paint, soldering and welding etc. Lead dust and vapors produced are dispersed during those works result in lead exposure[4]. While subjective complaints, physical examination results, psychological tests are important for diagnosis but for a definitive diagnosis of lead poisoning , blood lead level (BLL) is more reliable[5].

Lead poisoning, which had been first described by Hippocrates, causes negative effects particularly on nervous, cardiovascular, renal, hepatic and hematopoietic

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system [6,7]. Many studies [13] reported prevalence of high BLL among male laborers working in workplaces where lead-containing materials are used. United States Adult Blood Lead Epidemiology and Surveillance (US-ABLES) has declared BLL <25 μg/dL[8] , BLLs ≤10 μg/dL as nontoxic level by US-Centers for Disease Control and Prevention (CDC) [9] and Occupational Safety and Health Administration of US (OSHA) [10] has declared BLLs ≥ 40 μg/dL in people working in environments where lead containing materials are used as lead poisoning.

There are lacunae in the data on cardiovascular, haematological parameters and their correlation with the blood lead levels in welders especially.

MATERIALS & METHOD

The present cross-sectional study was conducted on workers from several small scale industries where materials containing lead were used between from July 2008 to April 2010 in Bangalore city, India. Study group included 455 males, spray painters and arc welders for 8hrs a day since two to six years. The age and sex matched control group was office staff of the same industries. The approval of the Ethical Committee Board of institution , written informed consents of the workers were obtained.

Inclusion criteria were males aged between 25 to 45 years, history of symptoms since last three months suggesting of lead exposure. Exclusion criteria were subjects having systemic illness,and symptoms having more than three months.

Procedure: Prestructured questionnaire was used to record the clinical, sociodemographic profile and clinical examination. Possible symptoms of lead poisoning such as abdominal pain, constipation, lack of appetite, weakness, weight loss, muscle pain, headache, nervousness, and hand tremor were questioned. Among these symptoms, those which have been experienced in the last three months were accepted. During the physical examination, symptoms which are considered as pathognomonic were investigated like: Burton line, Gubler stain, lead colic, hand drop, and foot drop [11].

After recording of anthropometrics parameters, the following investigations were recorded during their work shift.

BLL were estimated using auto analyzers with standard biochemical methods. Individuals with BLL ≥10 μg/dL were accepted as people with high BLL,and results ≥40 μg/dL were categorized as cases of lead poisoning[9] [10].

RBCs with basophilic granulation were investigated on the peripheral smear. Presence of more than 500 erythrocytes with basophilic granulation in one million erythrocytes was accepted as a positive result[12].

Red blood cell count (RBC), Haemoglobin (Hb) content, Haematocrit (Hct) were estimated using auto analyzers with standard biochemical methods. Blood indices like Mean Corpuscular Volume (MCV),Mean Haemoglobin Concentration (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) were calculated by RBC,Hb,Hct levels.

Reticulocyte count done by supravital stain and expressed in percentage.

Blood pressure (BP) is recorded by Sphygmomanometer in sitting position after five minute of rest. Two reading with atleast 2 minutes of intervals was set. Both Systolic and Diastolic BP were recorded. SBP > 140mmHg and DBP >90mmHg was taken as hypertension[13].

The preventive measures for workplaces and their current applicability were evaluated with questionnaire. All the study group workers were using personal protective equipments like mask with glass, gloves and boots. The same tests were applied for the control group.

Statistical Method: Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS-17). The results were expressed as mean (M) ± standard deviation (SD). Chi square test (x^2), Fisher's exact test, Student t test, were applied for analysis. Level that $p < 0.05$ was taken as statistically significant.

RESULTS

Mean ages of both study and control group were similar (t= 0.526, p= 0.600). Mean duration of exposure was 3.12±2.32 years in study group.The mean BLL of study group was 1.988±0.312 μg/dL, compared to control group which was 1.77±0.2865 μg/dL (t= 16.82, p = 0. 612).The lowest BLL value was 0.1 μg/dL, the highest value was 26.6 μg/dL. Study group, showed 36

workers with high BLL (≥10 µg/dL). In that 20 were welders.

Table 1: Distribution of workers with and without high BLL in terms of various features			
Features	**High blood lead level (≥10 µg/dL)**		**Statistical analyses**
	Without (n=419)	**With (n=36)**	**x²; p**
	n (%)	**n**	
Age group (yr): <30	130(31)	10	3.165; >0.05
30 to 39	139(33)	16	
≥40	150(36)	10	
Education:Illiterate	05 (0.23)	2	16.504; <0.001
Below secondary	60(14.8)	14	
Above secondary	354(85)	20	
Smoking: Yes	213(51)	16	0.154; >0.05
No	206(49)	20	
Alcohol: Yes	52(12)	8	0.378; >0.05
No	367(88)	28	
Duration of work (yr):<2	108(26)	5	22.584; <0.001
2 to 5	262(63)	23	
≥5	49(11)	8	

Table 2. The prevalence of symptoms in study and control groups			
Symptoms	**Study group**	**Control group**	**Statistical analyses**
	(n=455)	**(n=455)**	
	n (%)	**n (%)**	**Z; p**
Abdomen pain	16(3. 5)	8(1.7)	0.007; >0.05
Constipation	12(2.7)	40(0.8)	0.232; >0.05
Anorexia	5(1.0)	2(0.4)	0.037; >0.05
Weakness	40(8.7)	10(2)	0.075; >0.05
Headache	42(9.2)	12(2.)	0.003; >0.05
Nervousness	34(7)	8(1.7)	0.577; >0.05
Tremor in hands	10(2)	0	0.307; >0.05
Muscle pain	41(9)	7(1.4)	0.307; >0.05

Table 3. The prevalence of symptoms in workers with and without high BLL

| Symptoms | High blood lead level (≥10 μg/dL) | | Statistical analyses |
| | Without (n=419) | With (n=36) | |
	n (%)	n (%)	Z; p
Abdomen pain	13(3)	3(8)	0.031; >0.05
Constipation	9(2)	3(8)	0.159; >0.05
Anorexia	5(1)	0	0.003; >0.05
Weakness	37(8.8)	3(8)	0.098; >0.05
Headache	38(9)	4(11)	0.067; >0.05
Nervousness	32(7.4)	2(5.5)	0.190; >0.05
Tremor in hands	10(2.3)	0	0.019; >0.05
Muscle pain	39(9.3)	2(5.5)	0.235; >0.05

Table 4. Several protective habits for workers with and without high BLL

| Habits | High blood lead level (≥10 μg/dL) | | Statistical analyses |
| | Without (n=419) | With (n=36) | |
	n (%)	n (%)	x^2; p
Habit of hand washing / taking a shower at the end of the work hours			
No	25(6)	10(28)	19.086; <0.001
Yes	394(94)	26(72)	
Washing their work wear period			
≤2 weeks	380(91)	33(92)	Fisher *P*= 0.343
≥2 weeks	39(9)	3(8)	
Wearing mask /gloves habit			
No	61(15)	8(22)	0.002; >0.05
Yes	358(85)	28(78)	

Table 5. Presence of hypertension and anemia in study group workers with and without high blood lead level.

| | High blood lead level (≥10 μg/dL) | | Statistical analyses |
| | Without (n=419) | With (n=36) | |
	n (%)	n (%)	Z; p
Hypertension			
No	374 (89)	22 (61)	0.032 ; >0.05
Yes	45 (11)	14 (39)	
Anaemia			
No	411(98)	36 (100)	0.311 ; >0.05
Yes	8(2)	0(0)	

Table 6: Correlation between blood lead level and blood pressures and hematological parameters

Pearsons Correlation	BLL (µg/dL)		
SBP (mmHg)	r = 0.021 p =0.81		
DBP(mmHg)	r = 0.037 p =0.7		
RBC(mill/cmm)	r =0.012 p =0.73		
Hb(gr/dl)	r = 0.08 p =0.1		
Hct (%)	r = 0.042 p =0.6		
MCV (fl)	r =0.011 p =0.84		
MCH (pg)	r = 0.038 p =0.4		
MCHC (gr/dl)	r = 0.072 p =0.11		
RBC: Red Blood Cell count, Hb: Hemoglobin, Hct: Hematocrit, MCV: Mean Corpuscular Volume, MCH: Mean			
Corpuscular Hemoglobin, MCHC: Mean Corpuscular Hemoglobin Concentration			

DISCUSSION

Study group showed no change in BLLs compared to controls. Low lead exposure rates and efficient institutional and/or personal protective measures may be the reason behind this result. We determined high BLL in 36 (8%) of the workers. Various studies from other countries plotted similar results. Kim et al. [14]. Reynolds et al. [15] and Yassin et al. [16] reported prevalence of high BLL among workers where lead-containing materials were used. No correlation was found between prevalence of high BLL and age groups in the study group ($p>$ 0.05). Similar results were shown by Saito et al. [17] and Bakirci & Bakirci [18].The prevalence of high BLL was higher in individuals with illiterate and below secondary level of education compared to that of workers with an educational background of above secondary school level ($p < 0.05$). Awareness of work conditions and regular use of the protective measures ,life style modification were the reason here. Smoking in workplaces causes workers to frequently contact their lead-contaminated hands with their mouth and by inhalation of lead in the smoke of a cigarette. Smoking, causes lead intake by these two routes, is a risk factor for lead poisoning[19,20]. Adeniyi & Anetor[21] reported a higher prevalence of lead poisoning among alcohol consuming lead worker and alcohol consumption presents a risk for lead poisoning. In the present study, no difference was determined between smokers, non smokers and alcoholics , non-alcoholic in terms of high BLL ($p>$0.05). High BLL was determined to be more in workers (n=22) who worked more than five year ($p< 0.05$).This may be a result of long duration of low

dose lead exposure along with negligence(history was confirmed by coworkers) towards the use of preventive measures. Some studies[14] [17]   were reported similar results. Prevalence of high BLL in welders and painters was not statistically significant as both the work place and control measures were adequate. No difference was determined in BLLs in terms of symptoms prevalence in study group compared to controls . Similar findings were seen with a study by M Tozun[3]. In contradictory many studies have revealed loss of muscle strength, gastrointestinal symptoms, and a reduction in attention-memory functions as the presenting symptoms in study group[22] [23] [24]. No statistical difference was found in terms of symptom prevalence between workers having and not having high BLL (for each symptom $p>$0.05). A study conducted by Kirkby et al. [11] reported a similar result as well. Prevalence of high BLL in workers who had hygiene practice were lower compared to workers who did not have those habits ($p< 0.05$). Similar results were obtained in a study [25]. In the present study, no erythrocytes with basophilic granulation were determined. A study conducted by Onarlioglu et al. [26] revealed similar results. Though lead exposure is a risk factor for anaemia and hypertension ,there was no correlation between these and BLL.

CONCLUSION

Lead poisoning is an important and preventable health problem that particularly affects the industrial workers working in small units. This study concludes that there was no correlation between cardiovascular and

haematological parameters and BLL in spray painters and welders working in controlled workplace with regular use of protective measures.

Conflicts of Interest: Nil

Source of Fund: Nil

Ethical Clearance: Obtained from IEC of the same institution

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Short Term Memory Status by Visual Tasks using Object Test

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ABSTRACT

The process of learning is most essential to become academically more effective, and memory status plays an important role. The Present study is an attempt to establish normal short term memory status by visual tasks in medical students. To evaluate the influence of gender and also to evaluate changes in short term memory status after application of some standard memory improvement methods. Short term memory status for object test was significant which may be due to good sight, one's relation with the world around, source of pleasure, three dimension effects etc. Females showed a significantly better memory status for object test due to better attention, involvement in task and concentration. Due to effectiveness of memory improvement methods, there was statistically significant improvement in memory status in all the subjects and more so in females.

Keywords- *memory improvement methods, Source of pleasure, Object test.*

INTRODUCTION

Robert S.Woodworth said that Human memory behaves as if organized in 3 kinds of stores, sensory stores, short term memory and long term memory. There are four stages or phases involved in memory: impression, retention, recall (or reproduction), and recognition. The first three stages correspond roughly to making a recording on a tape recorder, storing it in your file, and then playing it back at a later date [1.] According to Yves Ledanseurs Weighing almost 1.5 Kg. with an astronomical number of neurons and billions of connections, the brain – the most crucial part of the CNS – controls everything. Memory forms part of identity, intelligence and emotions of an individual[2]. It was stated by Elaine Marieb R. N that Short term memory, also called working memory, is a fleeting memory of the events that continually parade before you[3]. Kenneth Davis suggested that Memory is the physical system used to store information during the learning process and to retrieve it when it is needed[4]. .SM.Jhon.Walton Studied Ribot's law states that there is an inverse relationship between the strength of a memory and its recency i.e. old memories are better preserved; indeed, this is often observed at bedside[5]. So present study is an attempt to establish short term memory status in medical students, find out simple short term memory tests and evaluate changes in short term memory status after applying some standard methods for improvement of short term memory.

MATERIAL AND METHOD

Two hundred and one (201) young adolescent healthy undergraduate boys and girls of age group of 18 to 21 years studying in M.B.B.S of Al-Ameen Medical College Bijapur (Karnataka) were volunteers for this study. In object test a tray containing 15 commonly used objects, like lock & key, flower, pen, pencil etc was shown to the subjects for 30 seconds[6]. The tray was covered with cloth and then the subjects were asked to write the names of the objects on a paper. Results were expressed in percentage.

Association or linking method used for improvement of object test. Here the Subjects were asked to link the objects with each other and try to remember, for example the following are the objects-Soap, pot, school bag, tooth brush, table, chair, apple, Tiffin carrier, school bus etc how to link each other? Early morning a child wakes up, brushes his teeth, has bath with soap and takes water from a pot in to bucket, later sits on a chair and has an apple on the table, picks up the Tiffin carrier & school bag goes to school by school bus [2,7].

STATISTICAL ANALYSIS

Student's paired "t" test was used to analyze the memory status in all the subjects and in males and females separately before and after application of memory improvement methods.

'Z' test was used to compare the memory status of all the subjects and males and females separately for object test. The p value of < 0.05 was considered as significant in both the tests.

RESULT AND DISCUSSION

Short Term Memory status by visual task before and after application of certain memory improvement methods by using Object test were done and analyzed (Table1, 2 and 3).

Present study is an attempt to establish short term memory status in medical students, to find out simple tests to assess short term memory and evaluate changes in short term memory status after applying some standard methods for improvement of short term memory. The mean of memory status before application of memory improvement methods was found to be more in females than males, which was significant statistically(p< 0.05). This better memory status for object test may be due to several factors. Sight enriches one's relation with the world around. Through sight one can register millions of facts. Memories of the faces, colors and objects around exemplify the capacity of one's visual memory. Some people are more dependents on this method of recall. This type of memory is also linked to one's own areas of interest. Some people remember the faces more easily, where as others remember colors or landscapes. Some time we prefer to look at something that is a source of pleasure, curiosity, novelty or fear. An image charged with emotion is more easily remembered than a banal and habitual [2].The objects used in this test were household and commonly used. This may also be another factor for better memory status for object test than words or other tests.

A statistical gender difference i.e. females showed an increased memory status than males (p < 0.05) for object test in the present study.

The memory status in the present study appears to be better in females than males in all the tests which may be due to the part played by the factors influencing short term memory like better attention, involvement in task, intention, concentration and effort.

Association method was used for improvement of object test. Here the Subjects were asked to link the objects with each other and try to remember[2, 7].

The memory status in all the subjects was found to be increased and was statistically highly significant (p < 0.001) when compared to the memory status before application of memory improvement methods.

The memory status in males was found to be increased which was statistically highly significant (p < 0.001) when compared to memory status before application of memory improvement methods.

The memory status in females, like in males, was found to be increased and was statistically highly significant (p < 0.001) when compared to memory status before application of memory improvement methods.

A statistically significant (p< 0.001) improvement in memory status was observed in females than males.

The observed improvement in short term memory status for object test is suggestive of effectiveness of association method[2, 7]. Females showed statistically significant increased improvement in memory status when compared to males which may be due to effective and better utilization of association method.

Table1- Memory status before and after application of Memory improvement method

	MS	**MSA**
Mean	81.72	87.99
SD	12.46	11.81
SEM	0.88	0.83

(MS – Memory status, MSA - Memory status after application of Memory improvement method,

SD- Standard Deviation, SEM- Standard error of mean)

Table 2- The 'Z' and 'p' values of Male Vs Female Z-test of Memory status before application of Memory improvement method

	Z-value	**p-value**
Male Vs Female	3.18	P<0.05

Table 3- The't' and 'p' values of Student's paired 't' test before and after application of Memory improvement method in all the subjects, male and female

All the Subjects		Male		Female	
t-value	p- value	t-value	p-value	t-value	p-value
8.60	P<0.001	6.68	P<0.001	5.53	P<0.001

CONCLUSION

Statistically there was a gender difference in short term memory status in which females showed better short term memory status than males which may be due to their better attention, involvement in task, intention, concentration and effort in this study.

There was a statistically significant improvement in memory status in all the tests in all the subjects, male and females after application of memory improvement method like association method which may be due to effectiveness of this method. Females showed better improvement than males after application of memory improvement method which was statistically significant which may be due to effective and better utilization of memory improvement method.

Short term memory status by visual task appears to vary with the nature of the test. Short term memory status can be thus assessed by simple tests like alphabetical, numerical, words and object tests which can also be recommended to evaluate short term memory status in diseases affecting memory as bedside tests.

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Evaluation of Effect of Yoga on Pulmonary Functions and Hand Grip Strength in College Students

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ABSTRACT

Yoga is an ancient Indian philosophical discipline designed to bring balance and health and to increase longevity. To assess the beneficial effect of yoga to cope up with stress and to improve the overall health and performance of students, the present study has been carried out. The study design was a cohort study. The study was conducted in the Department of Physiology, Government Kilpauk Medical College, Chennai. 52 students in the age group of 17 – 22yrs were given yoga training for 4 weeks. 52 age and gender matched students formed the control group. Breath Holding Time (BHT), Forced Vital Capacity (FVC), Peak Expiratory Flow rate (PEFR) and Hand Grip Strength (HGS) were done for both study and control groups at baseline and at the end of 4 weeks. Statistical analysis was done using the paired student's "t" test. There was statistically significant improvement of Breath Holding Time (BHT), Forced Vital Capacity (FVC), Peak Expiratory Flow Rate (PEFR) and Hand Grip Strength (HGS) in the study group (group I) following 4 weeks of yoga practice (p < 0.01) while there was no significant change in these parameters in the control group (group II). The study concludes that regular yoga practice can improve the pulmonary functions as well as skeletal muscle strength of young individuals and this positive change could persist into their adulthood.

Keywords: yoga, students, Breath Holding Time, Forced Vital Capacity, Peak Expiratory Flow Rate, Hand Grip Strength

INTRODUCTION

In this modern era, everyone experiences stress because of highly competitive and challenging lifestyle. Yoga is an ancient Indian philosophical discipline designed to bring balance and health to increase longevity[1]. The principles of yoga practice involves the adoption and maintenance of various psychophysical postures along with controlled breathing techniques. Yoga mainly consists of Asana (Posture – a particular position of the body which contributes to steadiness of body and mind), Pranayama (Breathing technique – to control the breathing in a superior and extra – ordinary way to get maximum benefits) and Meditation[2]. By practicing them, one develops agility, balance, endurance, co-ordination and great vitality. It secures a fine physical structure and helps to keep the body free from diseases. It helps to develop the spirit of harmony by coordinating the mind and body of an individual. Yoga may be an important tool for every individual for maintaining health and improving quality of life.

Suryanamaskar is an essential component of yoga which provides all of the key health benefits of yoga. These are performed so that they alternately stretch the spine backwards and forwards along with breathing control. Breath is the dynamic bridge between body and mind[3] and pranayama (breathing techniques) is one of the most important yogic practices, which can produce different physiological responses in healthy individuals

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[4]. Pranayama is an art of prolongation and control of breath, which helps to bring the conscious awareness in breathing; to reshape breathing habits and patterns [3]. The persistent conditioning of breathing pattern of pranayama increases the pulmonary function in healthy individuals [4].

Yoga has been reported to improve the pulmonary functions to a much greater extent as it involves physical activity as well as breathing exercise [5,6]. Pulmonary function tests (PFT) serve as a tool of health assessment. Pulmonary functions are generally determined by the strength of respiratory muscles, compliance of the thoracic cavity, airway resistance and elastic recoil of the lungs. Vital capacity is a critical component of good health and its determination is important for normal subjects as well as for patients on treatment.

Hand grip dynamometry is a simple method to assess skeletal muscle function and nutritional status of an individual [7]. They can also be used as objective clinical measures for determining the severity of disease process and effectiveness of rehabilitation programs. To attain healthy population, college campuses serve as crucial settings to implement effective interventions. If college students make positive changes in yogic practice, these changes could persists into their adult years. Many reports supported the beneficial effects of yoga training on pulmonary functions and skeletal muscle strength. To assess the beneficial effect of yoga to cope up with stress and to improve the overall health and performance of students, and also to highlight the advantages of yoga among college students, the present study has been undertaken.

MATERIALS AND METHOD

The study design was a prospective cohort study. This study was carried out in the Department of Physiology, Government Kilpauk Medical College, Chennai. Before starting the study, clearance was obtained from the Institutional Ethics Committee and College Authorities.

Student volunteers of either gender in the age group of 17 – 22 years were involved in the study. Students with respiratory, cardiac, endocrine, musculoskeletal ailments, sportspersons, students already practicing yoga and students with history of recent medication use were excluded from the study. After obtaining written informed consent from the willing students, clinical examination was carried out to rule out the presence of co morbid illnesses. Our sample size was 104 of either gender, which was calculated based on Fleiss with continuity correction. They were divided into two groups of 52 students in each, using lottery method. Group I was the study group while Group II acted as the control group.

All the members of Group I underwent the same yoga training for one hour per day for a period of 4weeks between 6 to 7 am under the guidance of a trained instructor. The subjects were taught to do meditation, yoga and pranayama. Meditation was done in sukhasana for 5min and mild warming up for 5minutes. Then 5 rounds of Suryanamaskar was practiced for 30 minutes. Each round has 12 postures in which each posture is maintained for 30 secs. Then Nadi sodhana (alternate nostril breathing) ,Bhastrika (rapid breathing), and Bhramari (honey bee sound during expiration) pranayamas were also carried out for 5 min each. Shavasan was performed at the end for 5 min.

Pulmonary function tests such as Breath Holding Time (BHT), Forced Vital Capacity (FVC), Peak Expiratory Flow Rate (PEFR) and Hand Grip Strength (HGS) were measured in both groups before and after the study period. All the tests were performed at the same time of the day between 8 to 9 a.m. to avoid the diurnal variations. Breath Holding Time was measured from the time of holding the breath after quiet expiration till the breaking point of the held breath by using a stop watch in comfortable sitting position. The subjects were asked to hold breath by closing both nostrils voluntarily by pinching nose between the thumb and index finger with closed mouth. Forced vital capacity (FVC) and Peak expiratory flow rate (PEFR) were measured using Easy on PC spirometer. After explaining and demonstrating the procedure, the subjects were asked to take a deep breath and blow it into the mouth piece of the spirometer. A nasal clip was used to prevent the air flow through the nostrils. Three readings were taken in sitting posture at an interval of 3 minutes and the best of three was taken for interpretation.

Hand Grip Strength of dominant hand was assessed using a Hand Grip Dynamometer (INCO India Ltd., Ambala). After explaining the procedure with demonstration, they were tested with the arms extended at shoulder level, horizontal to the ground. They were asked to squeeze the dynamometer with maximum isometric effort which is maintained for about 5 seconds.

The hand grip strength was recorded in kilograms as indicated by pointer on the dynamometer. Three readings were taken at an interval of 2 minutes and the best of three was taken for interpretation.

RESULTS

Statistical analysis was done using the paired student's "t" test. Data was expressed as mean with standard deviation for parametric values and as frequency for non-parametric values. Results are showed with the p value.

Table No.1 shows the observations before and after 4 weeks in Group I. There was a highly significant increase in BHT, FVC & HGS and significant increase in PEFR in Group I subjects after yoga training. Table No.2 shows observations before and after 4 weeks in Group II. There was no significant change in BHT, FVC, PEFR and HGS in Group II subjects.

Table No. 1: Observations before and after 4weeks in Group I

PARAMETERS (Mean ± SD)	Baseline	After 4 weeks	P value
BHT (in sec)	44.11 ± 11.37	47.15 ± 11.63	<0.001
FVC (in L)	3.15 ± 0.67	3.20 ± 0.66	<0.001
PEFR (in L/s)	5.17 ± 1.37	5.76 ± 1.38	<0.01
HGS (in kg)	28.84 ± 10.04	30 ± 10.99	<0.001

Table No. 2: Observations before and after 4weeks in Group II

PARAMETERS (Mean ± SD)	Baseline	After 4 weeks	P value
BHT (in sec)	47.46 ± 13.59	46.82 ± 13.54	0.5078
FVC (in L)	2.95 ± 0.75	2.92 ± 0.72	0.1500
PEFR (in L/s)	5.65 ± 1.33	5.65 ± 1.33	0.2490
HGS (in kg)	27.2 ± 10.43	26.85 ± 10.48	0.0566

DISCUSSION

This study showed significant improvement in all studied parameters within a duration of four weeks, as our study population consisted of healthy young individuals. The results are consistent with studies conducted earlier by Madanmohan et al. [7], Parikh et al. [8] and Muller et al. [9] who proved the efficiency of yoga in improving pulmonary functions. Avadhany et al. have also conducted this study in pre pubertal children and found the same results [10].

Respiratory function depends on several factors, including chest expansion, lung dimensions, respiratory muscle strength, air way resistance and alveolar surface area. The FVC is an index of the volume of the respiratory apparatus, whereas the PEFR is the rate of air flow during expiration. Yogic postures in Suryanamaskar involve sustained isometric contraction which is known to increase skeletal muscle strength. By strengthening and increasing the endurance of the respiratory muscles, chest and lungs inflate and deflate to fullest possible extent [11]. Pranayamas are used to calm the body, raise energy levels, increase respiratory stamina, relax the chest muscles and expand the lungs. Pranayama is characterized by slow and deep inhalation along with prolonged exhalation. The prolonged expiration and efficient use of abdominal and diaphragmatic muscles trains the respiratory apparatus to get emptied and filled

more completely and efficiently. This act of breathing stretches elastin and collagen fibers interwoven among the lung parenchyma which in turn decreases elastic resistance and increases compliance. The maximum inflation and deflation is an important stimulus for the release of surfactants and prostaglandins into the alveolar spaces, which lead to an increase in the lung compliance [12]. Stimulation of pulmonary stretch receptors by inflation reflexively relax smooth muscles of larynx and tracheobronchial tree [13]. As a result of increase in respiratory muscle strength, increase in lung compliance and decrease in bronchial smooth muscle tone, FVC and PEFR were increased following yoga training.

In this study, BHT increased at the end of 4 weeks which is similar to results of Karmur et al. [2], Muller et al. [9] and Ankad Roopa B et al.[14]. Breath-holding time depends on initial lung volume. Greater lung volume decreases the frequency and amplitude of involuntary contractions of respiratory muscles, thereby lessening the discomfort of breath holding. Practice of yoga makes the stretch receptors to withstand more stretching. Also the sensitivity of the respiratory center to carbon dioxide is reduced. Hence, respiratory center can withstand higher carbon di oxide concentrations. With continuous training, one can exercise voluntary control on the respiratory muscles overriding the excitatory stimuli to respiratory centers [2].

Stress is an important precipitating factor of asthma, slow and deep breathing has a calming effect on the mind, which is not only helps to de-stress, but also improve the antioxidant status of the individual. Yoga is a form of mind-body medicine, which promotes positive affect and reduce negative affect to increase lung functions and reduce usage of bronchodilator in asthmatics [15].

In the present study, HGS also increased following yoga training. This is consistent with the findings of Madanmohan et al. [7] and Dash et al. [16]. Sustained isometric contraction of the shoulder, chest and arm muscles occur during steady state of yogic postures. The improvement in strength and endurance of these muscles can explain the significant increase in HGS [7, 17]. Raju et al. have noted that yoga training results in a significant increase in maximal work output with a significant reduced level of oxygen consumption per unit work [18]. The improvement in HGS following pranayama was ascribed to the oxygen requirement reducing effect of pranayama, as the availability of energy and oxidation of glucose is believed to influence the HGS proportionately [16,19].

Yoga practices might be interacting with various, somato-neuroendocrine mechanisms [19] and it can be used as psychophysiological stimuli to increase endogenous secretion of melatonin, which improves sense of well-being [20]. By reducing perceived stress and anxiety, yoga easing respiration and it can be beneficial in the prevention and cure of diseases [21].

CONCLUSION

Regular yoga practice can lead to improvement in the pulmonary functions and skeletal muscle strength of young individuals and this positive change could persist into their adulthood. This resultant effect of yoga could be used to improve the lung functions and thereby help in the treatment of lung diseases like bronchial asthma, allergic bronchitis, post infectious recovery, tuberculosis and many occupational diseases. The increase in muscular strength may be useful for the treatment of Rheumatoid arthritis. We would like to extend our study by performing similar cohorts among population of asthmatics, chronic smokers and rheumatoid arthritis. To conclude, we can incorporate the practice of yoga in our daily schedule for healthy living.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained

Abbreviations used in the study:

PFT – Pulmonary Function Test

BHT-Breath Holding Time

FVC- Forced vital capacity

PEFR- Peak expiratory flow rate

HGS – Hand grip strength

SD - Standard Deviation

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Influence of Age and Regular Exercise on Blood Pressure in Female Subjects

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ABSTRACT

Background and Aim:- Sedentary lifestyle is a major underlying cause of disease, disability and death. Many studies have shown that sedentary life style increases risk of hypertension and pre-hypertension. The frequency of coronary heart disease was five times more in light workers compared to heavy workers. Inactivity may diminish life expectancy not only by predisposing to age related diseases but also influence the aging process by oxidative stress. Since sedentary lifestyle is a major risk factor in development of hypertension, the present study was conducted to find effect of sedentary lifestyle and age on blood pressure.

Method:- 100 healthy sedentary and 100 non-sedentary female subjects in the age group of 25-55 years were selected randomly from the general population of Gadag city. Depending upon the age, subjects were divided into three groups for analysis. Blood pressure was recorded with a mercury sphygmomanometer in supine position in the right upper limb by auscultatory method after 30 minutes of physical and mental relaxation . Three readings were taken at an interval of 15 minutes each and an average of the three values calculated and compared between three groups.

Results:- There was statistically significant increase in systolic blood pressure in sedentary subjects of all the three groups compared to non-sedentary subjects. Diastolic blood pressure was found to be increased in sedentary subjects in all the three groups but statistically significant increase was found in group two and three.

Keywords :- *Age, Blood pressure, Exercise.*

INTRODUCTION

Current public health recommendations propose engaging in at least 150 minutes per week of moderate-to-vigorous activity to help prevent and manage multiple chronic conditions, notably cardiovascular disease, type 2 diabetes, obesity, and some cacers.[1]. Approximately 2 million deaths are reported every year attributable to physical inactivity . Data gathered on health surveys from around the world is that, the adults who are sedentary or nearly so range from 60-85%. A combination of improper diet, lack of physical activity cause premature coronary heart disease. Studies have shown that relatively modest lifestyle changes are sufficient to prevent almost 60% of hypertension and diabetes cases. [2]

Obesity can be defined as a state of excess adipose tissue mass.[3]

Walking 10,000 steps/days or more, irrespective of exercise intensity or duration, is effective in lowering blood pressure.[4]

Regular exercise has been reported to lower blood the pressure in young adults with essential hypertension. Older hypertensive subjects experienced smaller reduction in BP than younger counterparts.[5]

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Systolic, diastolic blood pressure and triglyceride levels were highest in sedentary subjects.[6]

A 6 months program of aerobic and resistance training lowered diastolic blood pressure but not systolic blood pressure in older adults with mild hypertension more than in controls. The concomitant lack of improvement in aortic stiffness in exercisers suggests that older persons may be resistant to exercise-induced reduction in systolic blood pressure.[7]

Since not much information is currently available on the effect of sedentary lifestyle on blood pressure in middle aged females, the current study aims to find out the role of age and sedentary lifestyle on blood pressure in the said group.

MATERIALS AND METHOD

The present study was conducted in the department of Physiology, J.J.M. Medical college, Davangere after taking the ethical clearance and subject consent. The study was undertaken to analyze the differences in blood pressure parameters between healthy sedentary and non-sedentary subjects in the age group of 25 - 55 years. 100 healthy sedentary subjects and healthy 100 non-sedentary female subjects were selected from the general population of Gadag city randomly. All the subjects gave consent after explaining the procedure of the non-invasive technique to them. A brief personal history, childhood obesity, detailed history of exercise and a clinical examination of all the systems were done to exclude medical problems and to prevent confounding of results. Before recording the blood pressure the subject was asked to relax physically and mentally for 30 minutes.

The inclusion criteria in this study were

- Apparently healthy females in the age group of 25-55 years.

The exclusion criteria in this study were

- Subjects suffering from endocrinal disorders
- Hypertensive individuals
- Pregnant and lactating women
- Subjects with renovascular and cardiovascular diseases.

TABLE.1 AGE-WISE DISRTIBUTION OF CASES

Age groups (years)	Sedentary	Non-sedentary
Group – I (26-35 years)	22	24
Group – II (36-45 years)	42	36
Group – III (46-55 years)	36	40
Total cases	**100**	**100**

Blood Pressure Measurement (BP in mm Hg):- Blood pressure was recorded with a mercury sphygmomanometer, in supine position in the right upper limb by auscultatory method. Similarly, three readings were taken at an interval of 15 minutes each and an average of the three values calculated. Pulse Pressure (PP) was calculated by Systolic Blood Pressure (SBP) minus Diastolic Blood Pressure (DBP). The Mean Arterial Pressure (MAP) was calculate by (MAP=DBP+1/3PP)

STATISTICAL ANALYSIS

The results were given as Mean ± Standard Deviation and range values. Comparisons were made between sedentary and non-sedentary subjects and for different age groups. Students t-test (Unpaired) was used for comparisons between the groups. A p-value of 0.05 or less was considered as statistical significant.

RESULTS

Blood pressure (mmHg): The Mean systolic blood pressure (mm of Hg) in sedentary subjects was 129.0 ± 11.2 and in non-sedentary subjects the Mean systolic blood pressure was 121.0 ± 8.9. There was a statistically significant increased in systolic blood pressure in sedentary subjects when compared to non-sedentary subjects. (P < 0.001), The Mean diastolic blood pressure (mm of Hg) in sedentary subjects was 83.2 ± 8.4 and in non-sedentary subjects the Mean diastolic blood pressure was 76.6 ± 6.3. There was statistically significant increase in diastolic blood pressure in sedentary subjects when compared to non-sedentary subjects. (P < 0.001), (Table-2)

In sedentary subjects in Group-I the Mean SBP (mm of Hg) was 123.5 ± 12.3; in Group-II the Mean SBP (mm of Hg) was 127.5 ± 11.5 ; in Group-III the Mean SBP (mm of Hg) was 135.7 ± 5.4.(Table-3)

In non-sedentary subjects in Group-I the Mean SBP (mm of Hg) was 112.5 ± 8.4; in Group-II the Mean SBP (mm of Hg) was 119.9 ± 7.8 ; in Group-III the Mean SBP (mm of Hg) was 125.9 ± 6.0. .(Table-3)

There was statistically significant increase in Mean SBP (mm of Hg) in sedentary subjects compared to non-sedentary subjects in all the groups.

In sedentary subjects in Group-I the Mean DBP was 79.4 ± 9.3 in Group-II the Mean DBP was 82.0 ± 9.3 ; in Group-III the Mean DBP was 87.9 ± 2.8. .(Table-4)

In non-sedentary subjects in Group-I the Mean DBP was 73.3 ± 7.3 ; in Group-II the Mean DBP was 72.9 ± 6.1 ; in Group-III the Mean DBP was 80.1 ± 3.4. .(Table-4)

There was statistically significant increase in DBP in sedentary subjects in Group-II and in Group-III when compared to non-sedentary subjects of the same age groups. The Mean DBP in Group-I was slightly increased in sedentary subjects compared to non-sedentary subjects of the same age group.

TABLE – 2 COMPARISON OF BLOOD PRESSUREBETWEEN SEDENTARY AND NON-SEDENTARY SUBJECTS

Groups		SBP (mm of Hg)		DBP (mm of Hg)		PP (mm of Hg)		MAP (mm of Hg)	
	n	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
Sedentary	47	100-140	129.0 ±11.2	60-90	83.2 ± 8.4	38-56	45.9 ± 5.0	73.3-06.7	98.4 ± 9.1
Non-sedentary	58	100-136	121.0 ± 8.9	60-88	76.6 ± 6.3	30-60	44.4 ± 5.9	73.3-02.0	91.4 ± 6.7
Mean difference		8.0		6.6		1.5		7.0	
Significance	t	4.11		4.58		1.37		4.56	
p		< 0.001, HS		< 0.001, HS		0.17, NS		< 0.001, HS	

All values expressed as Mean ± SD

Analysis for all parameters done by unpaired 't' test

HS-Highly significant, S- Significant, NS- Not significant.

TABLE – 3   AGE RELATED CHANGES IN SYSTOLIC BLOO PRESSURE BETWEEN SEDENTARY AND NON-SEDENTARYSUBJECTS.

Age group (yrs)			Non – Sedentary		Significance	
	N	Mean ± SD	n	Mean ± SD	t	p
Group-I (26-35 yrs)	13	123.5 ± 12.3	15	112.5 ± 8.4	2.72	**< 0.05, S**
Group-II (36-45 yrs)	19	127.5 ± 11.5	14	119.9 ± 7.8	2.26	**< 0.01, S**
Group-III (46-55 yrs)	15	135.7 ± 5.4	29	125.9 ± 6.0	5.55	**< 0.001, HS**
Total No. of cases	**100**		**100**			

All values expressed as Mean ± SD

Analysis for all parameters done by unpaired 't' test

HS-Highly significant, S- Significant, NS- Not significant.

TABLE – 4   AGE RELATED CHANGES IN   DIASTOLIC BLOOD PRESSURE BETWEEN SEDENTARY AND NON–SEDENTARY SUBJECTS.

Age group (yrs)	Sedentary		Non-Sedentary		Significance	
	N	Mean ± SD	N	Mean ± SD	T	P
Group-I (26-35 yrs)	13	79.4 ± 9.3	15	73.3 ± 7.3	1.90	**0.07, NS**
Group-II (36-45 yrs)	19	82.0 ± 9.3	14	72.9 ± 6.1	3.41	**< 0.01, S**
Group-III (46-55 yrs)	15	87.9 ± 2.8	29	80.1 ± 3.4	8.12	**0.001, HS**
Total No. of cases	**100**		**100**			

All values expressed as Mean ± SD

Analysis for all parameters done by unpaired 't' test

HS-Highly significant, S- Significant, NS- Not significant.

DISCUSSION

In our study there was an increase in both systolic and diastolic blood pressure in sedentary subjects when compared to non-sedentary subjects.It was also found out that there was an increase in blood pressure with advancing age.

It was also observed that in females with advancing age there is a gradual decline in physical activity accompanied with weight gain. The possible contributing factors could be a lack of awareness on the beneficial effects of exercise. Cultural and social factors, educational status of the subjects could also play a minor role.

Physical inactivity decreases the production of Nitric Oxide (NO) by the abnormal endothelium, which leads to changes in vessel diameter leading to vascular

structural changes which results in hypertension.[8]

Regular aerobic exercise can prevent the age-associated loss in endothelium-dependent vasodilation and restore levels in previously sedentary middle aged and older healthy women. This may represent an important mechanism by which regular aerobic exercise lowers the risk of cardiovascular disease in this population[9].

Regular physical activity appears to slow the normal loss of elasticity and compliance in the human cardiovascular system and can reverse some of the age-related declines in arterial stiffness[10].

The enhanced acetylcholine-induced decrease in systemic blood pressure following regular daily exercise is primarily due to the augmented synthesis of nitric oxide in the endothelium of peripheral vasculature. This change in the function of endothelium could be important in the adaptation of circulation to exercise training[11]

Regular aerobic exercise both attenuates the age-associated decline in cardiovagal Baroreceptor sensitivity, and partially restores the loss of cardiovagal BRS in previously sedentary middle-aged and older healthy women. This could have important physiological implications for the maintenance of myocardial electrical stability and/or control of arterial blood pressure in older adults[12].

Similar findings were reported by multiple studies, Arakawa E[13], WHO Expert committee report[43], Sherma DL[15], Lester M et al.[16], Gupta SP et al.[17], Nippon Eiseiga Zasshi [18], Laurie Barclay.[19], Juan J Antonio CL.et al.[20]

Limitations of the study:- Hormonal assay and lipid profile estimation along with fat parameters would have given a better understanding about sedentary life style and its consequences. We need to evaluate the strategies and efficacy of physical activity.

CONCLUSION

The conclusions of our study are:-

Both SBP and DBP were increased in sedentary subjects. Both SBP and DBP were increased as the age advances both in sedentary and non-sedentary subjects but statistically significant increase was seen only in sedentary subjects.

Further research is recommended to understand how genes and gene-environment interaction leads to changes in blood pressure. A better understanding of ethnic/racial differences in the development and progression of various complications in sedentary lifestyle is needed.

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Depression, Anxiety and Stress Levels in Prehypertensive Males

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ABSTRACT

Background: As the pre-hypertension does not have symptoms, it may be missed in diagnosis usually. The interesting feature is its rate of progression which is very high and leads to development of hypertension. This is more applicable to those having blood pressure in the upper range of pre-hypertension.

Objectives: The current study was undertaken to observe the depression, anxiety and stress levels in prehypertensive males.

Materials and method: A total of 30 pre-hypertensive males and age matched healthy males were recruited for the study after obtaining written, informed consent. Depression, anxiety and stress levels were estimated by using DASS 42 questionnaire.

Results: Demographic variables are not statistically significant among the participants. There were significantly higher levels of stress, depression and anxiety in pre-hypertensive males when compared to healthy males.

Conclusion: The current study highlights the need of assessment of depression, anxiety and stress in patients with high blood pressure. We have observed significantly higher levels of depression, anxiety and stress in the patients with pre-hypertension when compared with healthy males. We recommend further detailed studies in this area to consider psychotherapy as a palliative care to the patients with hypertension for better prognosis.

Keywords: *Depression, Anxiety, Stress, Pre-hypertension*

INTRODUCTION

Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High BP defined that systolic BP (SBP) 130–139 mmHg or diastolic BP (DBP) 80–89 mmHg fall into the category of pre-hypertensive based on the evidence of a modest increase in cardiovascular risk among individuals with such levels [1]. As the pre-hypertension does not have symptoms, it may be missed in diagnosis usually [2]. The

interesting feature is its rate of progression which is very high and leads to development of hypertension. This is more applicable to those having blood pressure in the upper range of pre-hypertension [3, 4]. Further, studies have reported close association of pre-hypertension with obesity, metabolic syndrome, dyslipidemia and chronic renal diseases [5-11]. Earlier studies reported that repeated exposure to stress causes elevation of blood pressure and leads to hypertension. This effect may be due to the secretion of the hormones during the stressful conditions or unhealthy life style like decrease in sleep duration and consumption of alcohol to cope up the stress. Studies also reported that individuals experiencing depression, anxiety are more prone to develop hypertension. Interestingly, somatic symptoms, lower quality of life,

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and role impairment and psychological distress are commonly observed in the patients with hypertension. Though several studies reported association of depression, anxiety and stress with high blood pressure, the prevalence was still unclear. Hence the current study was undertaken to observe the depression, anxiety and stress levels in prehypertensive males.

METHODOLOGY

Study design: The present correlational study will be conducted at Department of Physiology, Mahavir Institute of Medical Sciences,Vikarabad. A total of 30 pre-hypertensive males and age matched healthy males were recruited for the study after obtaining written, informed consent. The following criteria were used for selection of the cases.

Inclusion criteria:

- Willing participants

- Apparently healthy men age 25-40 yrs

- SBP 130–139 mmHg and DBP 80–89 mmHg

Exclusion criteria:

- Body mass index (BMI) >40 kg/m2

- current use of any medications or therapy including use of oral contraceptives

- Use of dietary supplements known to affect BP

- Any eye or ear diseases or vestibular disorders

- unwilling participants

Method: Depression, anxiety and stress levels were estimated by using DASS 42 questionnaire [12].

Data analysis: Data was analyzed by SPSS 20.0. Student t test was used the significance of difference in depression, anxiety and stress scores. P value less than 0.05 was considered as significant.

RESULTS

Results are presented in table no 1 and 2. Table no 1 explains the demographic data of the participants and table no 2 presents the depression, anxiety and stress scores of the participants. Demographic variables are not statistically significant among the participants. There were significantly higher levels of stress, depression and anxiety in pre-hypertensive males when compared to healthy males.

Table no 1: Demographic data of parameters

Parameter	Pre-hypertensive male (n=30)	Healthy males (n=30)	P value
Age (years)	32±6	29±8	0.1058
Weight (kg)	64±12	67±8	0.2592
Height (cm)	176±26	168±28	0.2562

Table no 2: Depression, anxiety and stress scores of the participants

Parameter	Pre-hypertensive male (n=30)	Healthy males (n=30)	P value
Depression	17±6	12±4	0.0004***
Anxiety	10±4	8±3	0.0325*
Stress	24±7	16±6	0.0001***

(*P<0.05, **P<0.01, ***P<0.001)

DISCUSSION

The present study was undertaken to observe the levels of depression, anxiety and stress in pre-hypertensive males when compared to healthy males. Significantly higher levels of depression, anxiety and stress were observed in pre-hypertensive males. Psychological factors contributes to increased blood pressure through direct and indirect mechanisms. Earlier studies reported the prevalence of depression in hypertensive patients is 21.3%. Depression decreases quality of life and increases dependence on medications and risk of mortality [13, 14]. In contrast some of the studies reported that depression was not associated with hypertension [15]. Earlier studies suggested that anxiety is another significant cause of increased BP and is an independent predictor of future hypertension [16]. Recent study reported that depressive symptoms were present in 10%, anxiety in 70%, and stress in 10% of patients [17]. Diagnosing as hypertensive itself increases stress in the patients. This will explain the association of mental stress with stress. Further, visiting the physician also cause stress in the patients and boost the increase in the blood pressure and consistent stress may leads to hypertension. Though there is a close association of mental disorders, most of the times they were not diagnosed. Interestingly, it was reported that the overall awareness in the hypertensive patients is satisfactory but the mental heal disorders were neither reported by the patients nor diagnosed by the clinicians. Diagnosing and treating the mental health disorders in these patients may help to boost the prognosis. The present study results are in accordance with earlier studies as we have observed significantly higher levels of depression, anxiety and stress in pre-hypertensive patients.

CONCLUSION

The current study highlights the need of assessment of depression, anxiety and stress in patients with high blood pressure. We have observed significantly higher levels of depression, anxiety and stress in the patients with pre-hypertension when compared with healthy males. We recommend further detailed studies in this area to consider psychotherapy as a palliative care to the patients with hypertension for better prognosis.

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Effectiveness of Raja Yoga Meditation on Depression, Anxiety and Stress in Females with Premenstrual Syndrome

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ABSTRACT

The current study was undertaken to observe the effectiveness of Raja Yoga Meditation on depression, anxiety and stress in females with premenstrual syndrome. In the present study, a total of 8 participants were recruited and the participants served as self-controls. After recording the baseline values in premenstrual period (7 days before menstruation) of menstrual cycle, participants were trained Raja yoga meditation for a week days and then they have practiced for once in a day for six days in a week for 8 weeks under the supervision of a trainer. Post-intervention values were recorded after 8 weeks during premenstrual period. The following criteria were used in the selection of the participants. Results were presented in table no 1 and 2. Table no 1 present's demographic data of the participants and table no 2 present's depression, anxiety and stress scores before and after the intervention. There was a significant decrease in the scores of depression, anxiety and stress followed by the meditation (P<0.05). The study provides further evidence for the beneficial effects of practicing Raja yoga meditation in the management of stress. We recommend detailed studies in this area with more parameters and also recommend practicing the meditation in the regular life style.

Keywords: *Raja yoga meditation, Depression, Anxiety, Stress.*

INTRODUCTION

Yoga' is derived from the Sanskrit root 'Yuj' which includes meanings of binding to and joining to.[1] Yoga is a practical discipline incorporating a wide variety of practices whose goal is the development of a state of mental and physical health, well-being, inner harmony and ultimately " a union of the human individual with the universal and transcendent existence".[2] . It includes the practice of meditation, regulation of respiration with a variety of breathing exercises, and the practice of a number of physical exercises and postures, in which the focus is more on isometric exercise and stretching than on aerobic fitness.[3] Raja Yoga meditation is a form of meditation that is accessible to people of all backgrounds. It is a meditation without rituals or mantras and can be practiced anywhere at any time. Raja Yoga meditation is practiced with 'open eyes', which makes this method of meditation versatile, simple and easy to practice. Meditation is a state of being in that place just beyond every day consciousness, which is where spiritual empowerment begins. Spiritual awareness gives the power to choose good and positive thoughts over those which are negative and wasteful.[4] Studies show benefits of short-term and long-term brahmakumaris raja yoga meditation on physiological variables including blood pressure.[5]

Premenstrual syndrome (PMS) and premenstrual dysphoric disorder are contributed by hormonal fluctuations during the menstrual cycle.[6] although evidence for a hormonal abnormality has not been

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established, the symptoms of the premenstrual disorders are related to the production of progesterone. It was reported that the symptoms of PMS are due to GABArgic and the serotonergic systems. Metabolites of progesterone bind to gamma-aminobutyric acid (GABA) receptor of brain and decreases central GABA-mediated inhibition. The progestogens also thought to adversely affect the GABAergic system. The lowering of serotonin can give rise to PMS-like symptoms and serotonergic functioning seems to be deficient by some methods of estimating serotonergic activity in the brain; agents that augment serotonin are efficacious and are as effective even if administered only in the luteal phase. However, similar to the affective disorders, PMS is ultimately not likely to be related to the dysregulation of individual neurotransmitters. Brain imaging studies have begun to shed light on the complex brain circuitry underlying affect and behavior and may help to explicate the intricate neurophysiological foundation of the syndrome.[7]

Neuroimaging studies have shown that meditation results in an activation of the prefrontal cortex, activation of the thalamus and the inhibitory thalamic reticular nucleus and a resultant functional differentiation of the parietal lobe.[8] The factors decreasing anxiety during meditation are increased parasympathetic activity, decreased locus ceruleus firing with decreased noradrenaline, increased GABAergic drive and increased serotonin and decreased levels of the stress hormone cortisol.[9] Studies have shown beneficial effects of rajyoga meditation on anxiety and depression.[10,11] Medications for premenstrual syndromes are not fully curative for many patients. Meditation like raja yoga meditation can be considered as an adjuvant therapy in patients suffering from premenstrual syndrome. The current study was undertaken to observe the effectiveness of Raja Yoga Meditation on depression, anxiety and stress in females with premenstrual syndrome.

MATERIALS AND METHOD

The present experimental study was conducted at Department of Research, Little Flower Medical Research Centre, Angamaly. In the present study, a total of 8 participants were recruited and the participants served as self-controls. After recording the baseline values in premenstrual period (7 days before menstruation) of menstrual cycle, participants were trained Raja yoga meditation for a week days and then they have practiced for once in a day for six days in a week for 8 weeks

under the supervision of a trainer. Post-intervention values were recorded after 8 weeks during premenstrual period. The following criteria were used in the selection of the participants.

Inclusion criteria

Healthy females with PMS (PMS will be screened by using PMS questionnaire)[12]

Having regular menstrual cycles from 28 to 34 days

Willing participants with in the age group of 18-24

Exclusion criteria

The participants with any physical problem (musculoskeletal), psychiatric illness, or on medication including contraceptives will be excluded from the study

Unwilling participants.

Rajayoga meditation

Rajayoga meditation is a meditation course which is trained by Rajayoga Education and Research Foundation of Brahma Kumaris World Spiritual University (BKWSU).[13] The participants were trained the raja yoga meditation by an expert for a week days and then they started practicing the same for 8 weeks under the supervision of the expert.[13]

Assessment of depression, anxiety and stress

Depression, anxiety and stress were assessed by using DASS 42 questionnaire which consists of 42-items to measure negative emotional states.[14]

Data analysis

Data were analyzed by IBM SPSS Statistics for Windows, IBM Corp. Armonk, NY: Statistical tests used are student t test. $P < 0.05$ was considered statistically significant.

Ethical Consideration: The present study was approved by the institutional ethical committee of Little Flower Medical Research Centre, Angamaly.

RESULTS

Results were presented in table no 1 and 2. Table no 1 present's demographic data of the participants and table no 2 present's depression, anxiety and stress scores before and after the intervention. There was a significant

decrease in the scores of depression, anxiety and stress followed by the meditation (P<0.05).

Table no 1: Demographic data of the participants

S.No	Parameter	Mean ± SD
1	Age (years)	20±2
2	Height (cms)	164.71±3.77
3	Weight (kg)	46±8.41

Table no 2: Depression, anxiety, stress scores of the participants before and after the Raja yoga Meditation

S.No	Parameter	Pre intervention score	Post intervention score	P value
1	Depression	18.26±6.66	12.72±2.8	0.0478*
2	Anxiety	20.62±4.11	16.48±1.24	0.0163*
3	Stress	26.71±5.82	20.17±3.62	0.0173*

DISCUSSION

The main goal of the research was to establish whether Raja Yoga is effective in treating Depression and anxiety among women with PMS. There was substantial difference in the pre-study and the post – study of depression, anxiety and stress levels. The study proved that Raja Yoga would be effective in treating Depression among women who have PMS. Researchers conducted a pilot study to investigate the effects of meditation with yoga among 46 individuals with long term depressive disorder and found that there was not much of a difference in the depressive patients but it displayed a higher significance for treating low to high level depression [15]

Painful menstrual periods and PMS are the most common gynecologic problems, and are the most common reasons for increased absenteeism and more workdays with 50% or less of typical productivity per month in female employees [16]. A Swiss population-based health survey revealed that 57% women report having at least a mild degree of "premenstrual anger/irritability" or "premenstrual tearfulness/mood swings"; the median duration of physical and emotional symptoms is 3 days, and relationships with co-workers and/or family are most affected [17]

Recent studies reported an association between exercise and PMS, and indicated that a regular exercise habit might decrease some physical and psychologic premenstrual symptoms [18, 19] Pain, a common symptom of PMS, is a complex experience that affects mood and behavior, and can modify thought patterns leading to activation of different brain regions during cognitive tasks. [20]

One study demonstrated that women with PMS participating in a short-term yoga exercise in the luteal phase felt better and had improved attention.[19] Another study demonstrated that the mean scores of PMS and symptoms declined after 8 weeks of aerobic exercise training in the experimental group and suggested that 8 weeks of aerobic exercise effectively reduces the symptoms of PMS and can be used as a treatment[18]

An increase in alpha wave production induced by yoga exercise is closely associated with slower abdominal breathing. Yoga has positive effects on brainwave activity, and alpha brain waves are associated with states of peace, relaxation, creativity, mood elevation, and the release of serotonin; thus, the increase in alpha brain waves suggests that participants felt more relaxed after yoga exercise.[21]

Other studies investigated the mitigation of PMS effects in participants that actively performed yoga postures [22, 23,24]

A randomized controlled trial in India demonstrated Yoga Nidra practice was helpful in patients with hormone imbalances, such as dysmenorrhea, oligomenorrhea, menorrhagia, metrorrhagia, and hypomenorrhea [22]

A systematic review of five studies that examined three psychologic mechanisms (positive effect, mindfulness, and self-compassion) and four biologic mechanisms (posterior hypothalamus, interleukin-6, C-reactive protein. and cortisol), revealed that positive affect, self-compassion, and inhibition of the posterior hypothalamus and salivary cortisol mediated the effects of yoga on stress [25]

One report exploring the effects of yoga on persistent pain indicated that yoga could produce psychologic changes, such as increased awareness of mental and physical states, which may help patients to better understand their pain. Therefore, yoga practice might lead to increased pain acceptance.[26] Based on these positive findings, we conclude that regular practice of raja yoga helps to counteract the stress, depression & anxiety induced by PMS.

Limitations: The major limitation of our study is less sample size.

CONCLUSION

The study provides further evidence for the beneficial effects of practicing Raja yoga meditation in the management of stress. We recommend detailed studies in this area with more parameters and also recommend practicing the meditation in the regular life style.

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Obesity as Risk Factor in Type-2 Diabetes Mellitus in Middle Aged Women

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ABSTRACT

Background: Type 2 diabetes is a serious and common chronic disease resulting from a complex inheritance-environment interaction along with other risk factors such as obesity and sedentary lifestyle. Type 2 diabetes and its complications constitute a major worldwide public health problem, affecting almost all populations in both developed and developing countries like India with high rates of diabetes-related morbidity and mortality.

Materials & Method: The study was conducted at Department of physiology, MNR Medical College & Hospital, Sangareddy, during the period of June 2017 to December 2017. 110 volunteer women of age 35 to 55 years were selected as subjects. The likelihood and severity of type 2 diabetes are closely linked with body mass index (BMI).

Results: There is a close association between obesity and type 2 diabetes. Comparison of mean values of various parameters in controls and group I. within group I, the mean values of FBS, HDL,TG & VLDL are higher with more significance ($p<0.01$).

Conclusion: The roles of genes, lifestyle and other factors contributing to rapid increase in the incidence of type 2 diabetes. The core aims are to bring forward the new therapy strategies and cost-effective intervention trials of type 2 diabetes.

Keywords: Obesity, Type-2 diabetes mellitus, middle aged women

INTRODUCTION

Morbidity and prevalence of type 2 diabetes mellitus (DM) are increasing in obese middle aged women. Obesity is a major health problem throughout the world because of its high prevalence and its association with increased risk of cardiovascular disease[1]. Type 2 diabetes is a serious and common chronic disease resulting from a complex inheritance-environment interaction along with other risk factors such as obesity and sedentary lifestyle. Type 2 diabetes and its complications constitute a major worldwide public health problem, affecting almost all populations in both developed and developing countries like India with high rates of diabetes-related morbidity and mortality.A growing number of variables are being identified in population cross-sectional studies or laboratory studies that are related to mechanisms involved in obesity control[2]. The influence of obesity on type 2 diabetes risk is determined not only by the degree of obesity but also by where fat accumulates. Increased upper body fat including visceral adiposity is

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associated with the metabolic syndrome, type 2 diabetes, and cardiovascular disease[3] Beyond differences in body fat distribution, emerging evidence suggests that different subtypes of adipose tissue may be functionally distinct and affect glucose homeostasis differentially. Adult humans have limited and variable numbers of brown fat cell[4] which play a role in thermogenesis and potentially influence energy expenditure and obesity susceptibility[5]. Of greater concern is that cardiovascular complications of obesity are on the increase,including the incidence of stroke,end-stage renal disease and heart failure[6].

MATERIALS AND METHOD

The study was conducted at Dept of physiology, MNR Medical College & Hospital, Sangareddy, during the period of June 2017 to December 2017. 110 volunteer women of age 35 to 55 years were selected as subjects.

INCLUSION CRITERIA

1. Only female subjects are selected of BMI . 25 Kg/m2

2. Subjects with no family history of diabetes.

3. Subjects with no history of cardiovascular diseases.

EXCLUSION CRITERIA

1. Male subjects are excluded.

2. Subjects with past history of smoking and alcohol intake.

3. Subjects with family history of diabetes and hypertension.

MATERIALS

1. Measuring tape and Krups weighing machine to record height and weight.

2. Graduated measuring tape to measure waist and hip circumference.

3. Sphygmomanometer to record blood pressure.

4. Glucometer to record fasting blood sugar.

5. Lipid profile study.

METHOD

1.   Body Mass Index calculation :-

Standing height was recorded without shoes and with light clothes on a wall mounted measuring to the nearest of the centimeter (<5mm & 5mm).

Weight was recorded without shoes and with light clothes on a Krups weighing machine with a least count of 100 gm7.

BMI was calculated by the formula:

BMI = weight (kg) / height (mt2)

2.   Waist – Hip circumference ratio estimation :-

Waist circumference was measured by using a graduated tape when subjects were in a standing position. Waist circumference were obtained at the level midway between the lower rib margin8

Waist hip ratio was calculated by dividing waist circumference by Hip circumference.

3.   Sphygmomanometer :-

Conventional mercury sphygmomanometer (DIAMOND) to record indirect BP is used.Resting BP was recorded by auscultatory methods in sitting position. The mean of three measurements was used in the analysis.

4.   EasyGluco Glucometer

It is a medical device for determining the approximate concentration of glucose in the blood. A small drop of blood obtained by pricking the skin with a lancet, is placed on a disposable test strip that the meter reads and used to calculate the blood glucose level Each strip is used once and then discarded.

Volume of blood sample: it varies from 0.3 to 1ul.

Testing time: range from 3 to 60sec.

Display: glucose value in mg/dl or mmol/l. is displayed

5.   Study of Lipid profile : -

Mispa Excel Chemistry Analyser

The analyzer used is Mispa Excel Company. It is designed to be powerful and reliable but easy to use

biochemistry analyzer. It simplifies the end users task by offering the possibility of printing test results patient as well as by parameters. It's touch sensitive screen and software driven menu lead the user through the simple operation procedures10.

Collection of blood sample :-

After overnight fasting for 12 hrs, from each subject 3 ml of blood was obtained from cubital vein in a clean dry bottles containing EDTA. After 1 hr the serum was separated by centrifugation11. From the serum the following parameters were estimated :

    i. serum cholesterol.

    ii. serum triglyceride.

    iii. serum HDL cholesterol.

From these values of parameters other parameter values of lipid profile are calculated13,14.

VLDL cholesterol = It is calculated by

Total cholestrerol / 5.

LDL cholesterol = it is calculated by

Total cholesterol – (HDL cholesterol + VLDL cholesterol)

RESULT AND ANALYSIS

In present study 110 volunteer women of age 35-55 years were selected as subjects. Depending upon body mass index, these subjects were divided into following groups.

    Control – (BMI < 25 kg / m2)

    Group I (BMI 25-29.9 kg / m2)

    Group II (BMI 30-34.9 kg / m2)

    Group III (BMI 35-39.9 kg / m2)

    Group IV (BMI > 40 kg / m2)

The above groups were made on the basis of WHO classification of obesity.

Depending upon these, four observation tables have been derived. Each table consists of mean values, 't' test, 'p' values of various parameters along with interpretation[15,16].

TABLE NO. 1 GROUP I (BMI 25-29.9 Kg/m2)

Comparison of mean values of various parameters in controls and group I. with in group I, the mean values of FBS, HDL,TG & VLDL are higher with more significance (p<0.01).

PARAMETERS	CONTROLS Mean ± SD	GRI Mean ± SD	't' TEST	'P' VALUE	INTERPRETAION
PULSE RATE	75.65 ± 7.84	75.80 ± 4.62	0.67	> 0.1	NS
SBP	110.20 ± 7.81	121.33± 13.05	0.49	> 0.1	NS
DBP	74.26 ± 5.69	76.48 ± 7.39	0.90	> 0.1	NS
W/H RATIO	0.77 ± 0.025	0.78 ± 0.02	0.40	> 0.1	NS
FBS	90.73 ± 13.64	151 ± 41.99	5.3X10-8	<0.001	HS
TC	150.33 ± 43.24	177.86 ± 36.74	0.77	> 0.1	NS
HDL	46.58 ± 7.38	44.35 ± 10.57	0.01	0.01	HS
TG	110.93 ± 28.40	161.98 ± 102.67	0.002	<0.01	HS
LDL	91.69 ± 35.04	97.01 ± 21.14	0.13	> 0.1	NS
VLDL	22.6 ± 6.27	27.77 ± 21.11	0.008	< 0.01	HS

S: SIGNIFICANCE

HS: HIGHLY SIGNIFICANCE   NS: NOT SIGNIFICANCE

TABLE NO. II GROUP II (BMI 30 - 34.9 Kg/m2)

Comparison of mean predicated values of various parameters in controls and group II. Within group II, the mean values of W/H RATIO, FBS, HDL,TG & VLDL are higher with more significance (p<0.01)[16,20].

PARAMETERS	CONTROLS Mean ± SD	GRI Mean ± SD	't' TEST	'P' VALUE	INTER-PRETAION
PULSE RATE	75.65 ± 7.84	76.08 ± 5.82	0.25	> 0.1	NS
SBP	110.20 ± 7.81	121.6± 14.83	0.93	> 0.1	NS
DBP	74.26 ± 5.69	78.25 ± 9.33	0.92	> 0.1	NS
W/H RATIO	0.776 ± 0.025	0.81 ± 0.03	3.48X10-6	< 0.001	HS
FBS	90.73 ± 13.64	160.53 ± 44.62	1.35X10-9	< 0.001	HS
TC	150.33 ± 43.24	179.77 ± 40.08	0.91	> 0.1	NS
HDL	46.58 ± 7.38	42.60 ± 10.32	0.10	0.1	NS
TG	110.93 ± 28.40	169.09 ± 104.80	3.42X10-5	< 0.001	HS
LDL	91.69 ± 35.04	99.03 ± 25.95	0.19	> 0.1	NS
VLDL	22.6 ± 6.27	32.31± 20.37	0.0001s	< 0.01	HS

S: SIGNIFICANCE

HS: HIGHLY SIGNIFICANCE   NS: NOT SIGNIFICANCE

TABLE NO.III GROUP III (BMI 35-39.9Kg/m2)

Comparison of mean values of various parameters in controls and group III.with in group III, the mean values of W/H RATIO, FBS, HDL,TG and VLDL are higher with more significance (p<0.01)[18,24]. The mean values of TC and LDL are higher with less significance (p<0.05).

PARAMETERS	CONTROLS Mean ± SD	GRI Mean ± SD	't' TEST	'P' VALUE	INTER-PRETAION
PULSE RATE	75.65 ± 7.84	76.51 ± 5.15	0.87	> 0.1	NS
SBP	110.20 ± 7.81	126.66± 11.55	0.23	> 0.1	NS
DBP	74.26 ± 5.69	82.60 ± 9.42	0.64	> 0.1	NS
W/H RATIO	0.776 ± 0.025	0.85 ± 0.04	3.44 X 10-9	< 0.001	HS
FBS	90.73 ± 13.64	196.83 ± 57.42	3.42 X 10-9	< 0.001	HS
TC	150.33 ± 43.24	182.47 ± 33.28	0.05	0.05	S
HDL	46.58 ± 7.38	40.58 ± 10.43	0.01	0.01	HS
TG	110.93 ± 28.40	179.25 ± 47.43	5.68 X 10-5	< 0.001	HS
LDL	91.69 ± 35.04	100.07 ± 22.96	0.03	> 0.05	S
VLDL	22.6 ± 6.27	34.52 ± 8.75	0.01	0.01	HS

S: SIGNIFICANCE

HS: HIGHLY SIGNIFICANCE   NS: NOT SIGNIFICANCE

TABLE NO.IV GROUP IV(BMI 51-55yrs)

Comparison of mean values of various parameters in controls and group IV [20,30].with in group IV, the mean values of BMI,W/H RATIO, FBS, HDL,TG and VLDL are higher with more significance (p<0.01). The mean values of TC and LDL are higher with less significance (p<0.05).

PARAMETERS	CONTROLS Mean ± SD	GRI Mean ± SD	't' TEST	'P' VALUE	INTER-PRETAION
PULSE RATE	75.65 ± 7.84	77.86 ± 4.53	0.93	> 0.1	NS
SBP	110.20 ± 7.81	144.52 ± 10.26	9.4X10-11	< 0.001	HS
DBP	74.26 ± 5.69	86 ± 5.45	2.08X10-5	< 0.001	HS
W/H RATIO	0.77 ± 0.025	0.88 ± 0.01	9.07X10-25	< 0.001	HS
FBS	90.73 ± 13.64	200.55 ± 34.78	7.2X10-18	< 0.001	HS
TC	150.33 ± 43.24	186.8 ± 37.33	0.91	> 0.1	NS
HDL	46.58 ± 7.38	39.21 ± 6.65	0.82	0.01	NS
TG	110.93 ± 28.40	209.83 ±29.51	7.98 X 10-9	< 0.001	HS
LDL	91.69 ± 35.04	144.46 ± 9.87	0.007	< 0.01	HS
VLDL	22.6 ± 6.27	39.23 ± 6.06	1.2X10-7	< 0.001	HS

S: SIGNIFICANCE

HS: HIGHLY SIGNIFICANCE

NS: NOT SIGNIFICANT

DISCUSSION

There is a close association between obesity and type 2 diabetes.Comparison of mean values of various parameters in controls and group I[38,47]. within group I, the mean values of FBS, HDL,TG & VLDL are higher with more significance (p<0.01).Comparison of mean predicated values of various parameters in controls and group II[21,30].With in group II, the mean values of W/H RATIO, FBS, HDL,TG & VLDL are higher with more significance (p<0.01)[21,22].Comparison of mean values of various parameters in controls and group III. within group III, the mean values of W/H RATIO, FBS, HDL,TG and VLDL are higher with more significance (p<0.01)[23]. The mean values of TC and LDL are higher with less significance (p<0.05).Comparison of mean values of various parameters in controls and group IV. within group IV, the mean values of BMI,W/H RATIO, FBS, HDL,TG and VLDL are higher with more significance (p<0.01). The mean values of TC and LDL are higher with less significance (p<0.05)[13,24].

SUMMARY AND CONCLUSION

1. The present study revealed that

2. The mean values of waist hip ratio of obese women of group I, II. III and IV showed statistically highly significant increase in values respectively.

3. The mean values of fasting blood sugar of obese women of group I, II, III and IV showed statistically highly significant increase in values respectively.

4. The mean values of Total cholesterol of obese women of group I, II, III, IV showed statistically significant increase in values respectively.

5. The mean values of triglycerides of obese women in group I, II, III, IV showed statistically highly significant increase in values respectively.

6. The mean values of LDL of obese women of group III & IV showed statistically significant and highly significant increase in values respectively.

7. The mean values of VLDL of obese women of group I, II, III, IV showed statistically highly significant increase in values respectively.

8. The mean values of pulse rate of obese women of

group I, II, III, IV showed statistically non significant increase in values.

9. The mean values of SBP of obese women of group I, II, III showed increase in values but were found statistically non significant. In group IV showed statistically highly significant increase in values (p < 0.001, Table IV).

10. The mean values of DBP of obese women of group I, II, III, IV showed increase in values. In group IV showed statistically highly significant increase in values (p < 0.001, Table IV).

Conflict of Interest- Nil

Source of Funding- Self

Ethical Clearance -It was given by the institution.

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Study of Overweight and Obesity and Associated Factors among Undergraduate Medical Students in North India

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ABSTRACT

Background: Obesity negatively affects one's health or well-being. Due to rising prevalence of obesity and its adverse health effects it is being recognized as a serious public health concern. Medical students are very prone to obesity because of so much stress. Also junk food consumption is very common in medical student which is an important risk factor for obesity.

Aims and objectives: This study was undertaken to find out the prevalence of overweight and obesity its association with different risk factors in undergraduate medical students in a medical college of north India.

Material and method: The cross-sectional study was conducted on 128 undergraduate medical students. A detailed history was taken. Anthropometric measurements including weight, height, body mass index, waist-hip ratio and waist-height ratio were taken according to WHO criteria.

Result & Conclusion: The study showed high prevalence of overweight (30.2%) and obesity (3.9%). Obesity was significantly associated with non-vegetarian diet (p<0.01). Prevalence of overweight and obesity was highest in students with blood group B (12.4%) and least in blood group AB (0%). There was no significant association of obesity with junk food, family history and sleep duration (p >0.05). The importance of healthy eating habits and healthy life style needs to be emphasized. We created awareness for healthy living among medical students during the study.

Keywords: Obesity, medical students, junk food

INTRODUCTION

Obesity is medical condition in which excess body fat accumulates to the extent that it may have a negative effect on health. Overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. The cause of obesity is complex and multifactorial. Within the context of environmental, social and genetic factors, obesity results from long-term positive energy balance — the interaction of energy intake and energy expenditure.[1] A variety of factors, including diet, genetic predisposition, physical activities, physiological, and behavioral factors, are implicated as contributing factors to obesity.[2] The prevalence of obesity is rising in developing countries. In 2014, 13% of adults aged 18 and over in the world were obese.[3] The increasing prevalence of overweight and obesity is associated with many diseases including Diabetes mellitus, myocardial infarction, Stroke, Hypertension, and certain cancers. Overweight and obesity are the fifth leading risk factors for global death. At least 2-8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischemic disease burden and between 7% & 41% of certain cancer burdens are

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attributable to overweight and obesity.[4] A variety of factors, including diet, genetic predisposition, physical activities, physiological, and behavioral factors, are implicated as contributing factors to obesity.[5] The great prevalence of this condition, its severe consequences for health makes the prevention of obesity a major public health priority. Studies on medical students and health personnel in many countries suggested that obesity is a problem among these population groups.[6-10]

The aim of this study was to assess the prevalence of overweight and obesity among medical students of North India. We investigated the relationships between obesity and associated risk factors that could be pursued to help medical students more appropriately achieve and maintain a healthy body weight and minimize the risk of associated diseases in future.

MATERIAL AND METHOD

The present study was a cross-sectional study done on Ist year and 2nd year MBBS students of Rama Medical College, Hospital & Research Center Kanpur, UP. Total 129 students participated in the study. A brief introduction on obesity and overweight and its implications were explained and a written consent was obtained for the participation in the study. The general details of the students like name, age, sex, blood group, type of diet (Veg/nonveg), duration of sleep and frequency of exercise were taken. A detailed medical history was taken.

Following anthropometric parameters were measured using standardized techniques[11]:

Weight was taken by bathroom scale weighing machine (accurate up to 0.5 kg), the marking of the height in cm was made on the wall up to an accuracy of 0.5 cm. waist-hip ratio was significantly higher in male students than that in females (p < 0.05).

Height (cm) was measured to the nearest 0.1 cm by asking them to stand barefoot and facing the back in approximation to the wall and keeping a scale straight on the head. A point was marked by the pencil on the wall.

Waist circumference (cm) was measured using non-stretchable measuring tape midway between the lower rib margin and the iliac crest at the end of expiration (accuracy upto 0.1 cm).

Hip circumference (cm) was measured as the

maximum circumference over the buttocks (accuracy upto 0.1 cm).

Following parameters were calculated:

Body mass index: Body Mass Index (BMI) was calculated using the formula weight (kg)/ height (meters)[2] .The WHO BMI classification was followed, i.e. Underweight <18.50, normal range 18.50-24.99, overweight ≥25.00. For adults, WHO defines overweight and obesity as follows:

Overweight is a BMI greater than or equal to 25; and

Obesity is a BMI greater than or equal to 30.[12]

Waist-hip ratio (WHR): Central/abdominal obesity was defined as a WHR ≥0.90 for males and 0.85 for females.[13]

Waist-height ratio (WHtR) more than 0.5 will be considered as abnormal.[14]

Statistical analysis was done after collection of the data and it was analyzed and interpreted. Percentages and Chi square test were applied to it.

OBSERVATION & RESULT

The present study was conducted on 129 medical students, out of them 65 (50.4%) were males and 64 (49.6%) were females. Out of total students, 85 (65.9%) were normal weight, 39 (30.2%) were overweight and 5 (3.9%) were obese according to BMI. Nobody was underweight in our study group. (Table I).

87 (67.4%) students had normal waist-hip ratio and 42 (32.6%) were obese. Waist-hip ratio was significantly higher in male students than the female students (p<0.05) (table II). 79 (61.2%) students had normal and 50 (38.8%) had abnormally high waist-height ratio. There was no significant difference in waist-height ratio in male and female students (p>0.05) (table II).

We also observed that 45 (34.9%) students were vegetarian and rests (65.1%) were non-vegetarian. Prevalence of obesity was significantly higher in non-vegetarian than vegetarian students (p<0.1). Out of 129 students 35 (27.1%) used to take junk food regularly while 94 (72.9%) were noneaters of junk food or used to take occasionally. There was no significant difference in prevalence of obesity in junk food eaters and non-eaters and exercising and non-exercising students (P< 0.05).

33.3% students were exercising regularly while 66.7% were not exercising at all (table III).

History of endocrine disorders were only in 7 (5.4%) students and history of menstrual disorders was present in 6.3% (n= 4) female subjects only. 13.2% students had family history of overweight/obesity while 34.9% had family history of diabetes mellitus. There was no significant difference in the prevalence of obesity/ overweight and family history of diabetes/ obesity (Table IV).

76% students had normal sleep duration. 16% students slept for <6 hours while 8.5% slept for >8 hours. There was no significant difference between sleep duration and BMI (P> 0.05). There was no significant difference in the prevalence of obesity and duration of sleep (diagram III)

Prevalence of overweight and obesity was highest in students with blood group B (12.4%) and least in blood group AB (0%). Prevalence of obesity was 1.6% in students with blood group A and B (diagram IV)

Table I Distribution of subjects according to BMI

Sex	Normal	Overweight	Obese	Total
Male	41	23	1	65 (50.4%)
Female	44	16	4	64 (49.6%)
Total	85 (65.9%)	39 (30.2%)	53.9%)	129 (100%)

Table II Distribution of subjects according to waist/hip ratio and waist/height ratio

Sex	Waist/hip ratio		Waist/Height ratio	
	Normal	Obese	Normal	Obese
Male	37	28	39	24
Female	50	14	38	27
Total	87 (67.4%)	42 (32.1%)	77 (61.2%)	51(38.8%)

Table III Distribution of subjects according to food habits & exercise

BMI	Veg/nonveg		Junk food		Frequency of exercise	
	Veg (%)	Nonveg (%)	Eater	Non Eater	Regular exercise	Occasional/no exercise
Normal	28	57	20	65	28	57
Overweight	16	23	13	26	14	25
Obese	1	4	2	3	1	4
Total	45 (34.9%)	84 (65.1%)	35 (27.1%)	94 (72.9%)	43(33.3%)	86 (66.7%)

Table IV: Distribution of subjects according to family history & h/o endocrine disorder & menstrual disorder

BMI	F H/obesity		FH/DM		H/o endocrine disorder		H/o menstrual disorder	
	yes	no	yes	No	Yes	No	Yes	No
Normal	11	74	32	53	5	80	3	40
Overweight	4	35	11	28	1	38	1	16
Obese	2	3	2	3	1	4	0	4
Total	17 (13.2%)	112 (86.8%)	45 (34.9%)	84 (65.1%)	7 (5.4%)	122 (94.6%)	4(6.2%)	60 (10%)

Diagram I sleep duration and obesity

Diagram II blood group & obesity

DISCUSSION

According to WHO, body mass index is the most useful indicator of obesity in a population study. In our study, 30.2% students had BMI>25 Kg/m² and 3.9% students had BMI > 30 Kg/m². These results were similar those of the study done by Jayaraj et al in a medical college of south India where they found 31.3 % students with BMI > 25 kg/m² 6.3% students with BMI >30 kg/m². [15] They also found 4.5% students with BMI < 18.5% (underweight). In our study no students was underweight. In a study done on medical students of Gwalior, MP, India the prevalence of overweight and obesity was very low (9.93% were overweight and 1.53% were obese).[16] similar study was done in Delhi and reported a prevalence of 11.7% overweight and 2% obesity among medical students.[17]WHR has been found to be a more efficient predictor of obesity[18] If obesity is redefined using WHR instead of BMI, the proportion of people categorized as at risk of heart attack worldwide increases threefold.[19] in our study central obesity was significantly higher in male students than females similar results were found in a study done in Lahore[20]. Waist-height ratio is also a better indicator of obesity than BMI[21]. In our study there was no significant difference in waist-height ratio in male and female students.

We also found a significant relationship between non-vegetarian diet and obesity. Tiwari R et al did not find significant relationship between obesity and veg/nonveg diet although obesity was more prevalent in nonvegetarians[16]. Our study did not show any significant relationship between obesity and junk food while other studies showed that obese students had a higher caloric intake from butter and zinger burger. Fast food consumption may be associated with weight gain and its complications as indicated in CARDIA study, a population based prospective study of cardiovascular disease risk factor development in young adults followed for the subsequent 15 years. This study was limited by the lack of information on portion size and caloric density of the food consumed.[22]

We also did not any significant relationship between obesity and family history .this may be because changes in the genetic makeup of population occurs too slow to be responsible for obesity. But other studies could establish a positive correlation between family history and obesity.[15, 16]

CONCLUSION

This study revealed that prevalence of overweight and obesity is very high in medical students of North India and it is comparable to the findings of earlier studies in other states of India as well as other countries. No student in our study was underweight. Physical activity is used to be very low in medical students. First year medical students undergo very high stress of studies and new hostel life. This stress may be an important factor in developing obesity in these students. There are no parents to check their eating habits in the hostel. Students' fast food consumption increases in hostel. All these factors may be important in the pathogenesis of obesity in these students. Also their physical activity becomes very low. Students find no time to care for their health. This may lead to the development of several serious diseases. So this is a high time to consider this issue and encourage healthy life style and healthy food habits so that the danger of risk of developing chronic diseases in our future doctors can be prevented.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: The study was approved by institutional Ethics Committee.

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Assessment of Knowledge, Attitude, Practice on Obesity and Associated Disorders among Young Adults

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ABSTRACT

Introduction: Overweight and obesity are quickly rising in developing countries like India. **Aim:** This study was aimed at to evaluate and compare the knowledge, attitude and practices regarding Obesity among medical and non medical college students. **Material and Method:** We examined Knowledge, Attitude and Practice (KAP) on obesity among 200 medical and non-medical college students. KAP's were assessed and statistical analyses were done. **Results:** We found good and fair knowledge among medical students as compared to non medical student's population. This study also showed a high percentage poor knowledge in non medical student's population. A poor practice was also observed in overall student's population. The study also demonstrated a high level of knowledge practice gap among medical and non medical students. **Conclusion:** Not only enhanced knowledge regarding obesity is enough for prevention of this particular disorder but also development of perfect attitude and proper practice through life-style modification is required.

Keywords: Obesity, Young Adults, Knowledge, Attitude, Practice etc.

INTRODUCTION

Prevention through development of self knowledge, awareness and practices has an important role in identifying and managing obesity and associated disorders. The rising level of obesity has been called the most urgent challenge to public health for the 21st century and obesity is increasing at an alarming rate throughout the world [1,2]. The World Health Organization has recognized the problem of obesity. The organization called for urgent action to prevent the growing epidemic of obesity, which now affects developing and developed countries the same [3,4]. Today it is estimated that there are more than 300 million obese individuals in the world[2].

In general, obesity is associated with a greater risk of disability like type 2 diabetes mellitus, dyslipidemia, cardiovascular diseases such as hypertension, stroke and coronary heart disease, gall bladder disease, certain cancers and nonfatal conditions such as gout, osteoarthritis and infertility. Obesity also carries serious implications for mental health, mainly due to societal discrimination against fatness [4-6]. In India the incidence of obesity continues to increase and prevalence among adolescents varies between 10% and 30%. Obese individuals have higher rates of mortality and morbidity compared to non obese individuals[7,8]. India, the second most populous country in the world currently experiencing rapid epidemiological transition. It is now evident that previously dominant under nutrition due to poverty is being rapidly replaced by obesity [9]. Level of knowledge regarding obesity can only help out to detect the disease condition but perfect attitude and practice can prevent the disorder as well as diminish the associate complications. As per national family health

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survey in 2007 it is reported that prevalence of obesity is 6.5% and 7.6% in males and females respectively in Chhattisgarh. However, to date, no reports on the prevalence and Knowledge, Attitude and Practice study regarding obesity and associated disorders have been mentioned among the students as representative of young population in Chhattisgarh. Here we first time present the prevalence of generalized and abdominal obesity and associated disorders and knowledge, attitude and practice among this young student population of central part of India.

MATERIAL AND METHOD

This was a cross-sectional study done in the Dept. of Physiology, Govt. Medical College, Rajnandgaon, Chhattisgarh**.** Two hundred College Students were included for this study purpose. Among them 100 students were from medical college and rest from nonmedical colleges. Physically and mentally fit both Males and Females, age group of 17 to 25 years were included. Subjects suffering from hypothyroidism and any other type of metabolic/endocrine disorder were excluded.

Ethical consideration:

This study was approved by the Ethics Committee of Government Medical College, Rajnandgaon. The details of the study were explained to the subjects and written informed consent was obtained from all subjects.

Data collection method:

Demographic Characteristics and Knowledge, attitude, practice regarding obesity and related risk factor were reported through Questionnaire method.

Questionnaire design:

A questionnaire was designed by researchers and validated by Clinicians. To check the questionnaire's reliability, ten subjects completed the questionnaire two times with a 1-week interval. The questionnaire had four

parts including demographic information, knowledge (12 questions), attitude (8 questions), and practice (10 questions). In case of each KAP form, the correct answers were counted and the scores were categorized in three scales of 0 to 5 (Poor), 6 to 10 (Fair) and 11 to 20 (Good).

Score	Category
0 to 5	Poor
6 to 10	Fair
11 to 20	Good

Statistical analysis: Statistical analyses were performed using SPSS statistical package (version 16.0). Chi-square test was used to compare proportions between two groups.

RESULTS

Demographic Characteristics

Out of 200 subjects 100 Medical students (45 males and 55 females), 100 non medical students (32 males and 68 females) had completed records. The mean ± SD for age was for medical students (males 21.73 ± 2.19 years and females 20.6 ± 1.27) The mean ± SD for age was for non medical students (males 21.34 ± 1.38 years and females 19.97 ± 1.73 years). Overall, there was a preponderance of Hindus (91%), followed by Sikhs (3%), Muslims (1%) and Christians (3%) and others (2%).

Knowledge Attitude and Practices

To evaluate the KAP, the correct answers were counted in each KAP form, and the scores were categorized in three scales of 0 to 5 (Poor), 6 to 10 (Fair) and 11 to 20 (Good). (Table. 1). Table 2 has shown, Knowledge practice gap among medical and non medical students. The result shows (P ($\chi^2 > 0.502$) = 0.4784) **statistically insignificant. There is no independent association between Knowledge and Practice.**

Table 1: Knowledge, Attitude and practices of medical and non medical students

Category	Knowledge (%)		Attitude (%)		Practices (%)	
	Medical Students	**Non-Medical Students**	**Medical Students**	**Non-Medical Students**	**Medical Students**	**Non-Medical Students**
Good	69	12	77	23	4	2
Fair	31	29	23	57	52	36
Poor	0	19	0	20	44	62

Table 2: Knowledge-Practice gap among Medical and Non-Medical Students

K-P Gap	Medical Students (%)	Non-Medical Students (%)	Total (%)
Yes	44 *46.5*	49 *46.5*	93
No	56 *53.5*	51 *53.5*	107

$\chi^2 = 0.502$, **df = 1**, $\chi^2/df = 0.50$, **P($\chi^2 > 0.502$) = 0.4784** insignificant. Expected values are displayed in *italics.*

DISCUSSION

Obesity is a troublesome in developed as well as developing countries. Obesity is the epidemic of the twenty first century. In India the incidence of obesity continues to increase and prevalence among adolescents varies between 10% and 30% [7]. We first time presented obesity associated knowledge, attitude and practice among this young student population of central part of India. We found good and fair knowledge among medical students as compared to non medical student's population. This study also showed a high percentage poor knowledge in non medical student's population. A poor practice was also observed in overall student's population. The study also demonstrated a high level of knowledge practice gap among medical and non medical students. Though 69% medical students have good knowledge about obesity but only 4% medical students have good practice. This incident indicates that knowledge should be utilized by proper practice through life style modification. A KAP study done in south India also found that in spite of good or fair knowledge the attitudes and practices of the study participants were relatively poor [10].

This indicates that the large number of young population may be at a high risk of obesity and associated disorders in future. The present study reported high level of K-P gap agreed with several studies that have shown that people's knowledge, attitude and practices about obesity is incomplete and thus expresses the need for clinical awareness and supplementary training in obesity prevention. [1, 10-16]

CONCLUSION

Improved knowledge regarding obesity and about the cause of this disorder are not enough to defeat against the disease. For prevention of obesity in young adult require a perfect attitude toward obesity and good practice which can be develop by inspiration, awareness and stressing the importance of lifestyle modifications. Then only self-drive will build up toward proper attitude and practice to prevent obesity from the very beginning.

Conflict of Interest: Nil

Source of Funding: Self Funding

Ethical Clearance: Taken

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A Comparative Study of Retinal Sensitivity Test between Diabetic and Normal Adult

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ABSTRACT

Introduction- Diabetes mellitus is one of the most common diseases in the world and its prevalence is growing in both developed and developing countries. The complications of diabetes in the eye are due to damage in small blood vessels of retina known as Diabetic Retinopathy and Macular edema. This leads to gradual vision loss and blindness.

Material & Method- The present cross sectional observational study comprising of 84 cases was conducted in the Department of Physiology, Pt. Jawaharlal Nehru Memorial Medical College Raipur in collaboration with the Upgraded Department of Ophthalmology, Dr. B.R.A.M. Hospital, Raipur (Chhattisgarh) from August 2014 to July 2015. In the study, individuals was comprised in two different group i.e. Type 2 diabetic patients (Case) and normal healthy (Control) of age 30 years or older. Eye examination includes Best-corrected visual acuity, refraction, intraocular pressure, Slit lamp examination & Humphrey Visual Field Automated Perimetry 30-2 test were performed.

Results- In diabetic cases 3 males and 6 females belong to 30-40 year age group. 8 males and 6 females belong to 41-50 age group and 15 males and 4 females were more than 50 years of age. The random blood sugars in diabetic case were 179 ± 42 mg/dl and control were 124 ± 12 mg/dl of blood. Severity of field defects were statistically significant in diabetic cases as compare to control group.

Conclusion- Early diagnosis of diabetes and regular ophthalmic examination with preventive measure and early treatment we can retard the progression of retinopathy.

Keywords - *Diabetic retinopathy, Retinal sensitivity, Perimetry, Visual field defect.*

INTRODUCTION

Diabetes mellitus is one of the most common diseases in the world and its prevalence is growing in both developed and developing countries. It is common perception that diabetes is more of a disorder than of a disease.[1] More than 5 % of adults have this disease,

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with prevalence of about 1% in the youth to 13% in those older than 60 years. The prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with maximum increase in India.[2] In India with more than 62 million diabetics currently diagnosed with disease is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken.[3, 4] The epidemic of diabetes represents a major burden to health care systems around the world. Both Type 1 and Type 2 diabetes are increasing in children and adolescents. More alarming is the increase in Type 2 Diabetes in the youth related to obesity and physical inactivity.[5]

Currently, only one half of people having diabetes mellitus have been diagnosed. If left untreated or

hyperglycaemia continues uncontrolled over time, it will lead to significant and widespread pathological changes.[6]

The complications of diabetes in the eye are due to damage in small blood vessels of retina known as Diabetic Retinopathy and Macular edema. This leads to gradual vision loss and blindness. With increase in life expectancy of diabetics, the incidence of diabetic retinopathy (DR) has increased. Duration of diabetes is most important determining factor for diabetic retinopathy.[7] Early detection of diabetic retinopathy and timely intervention by laser photocoagulation can reduce the incidence of moderate visual loss in macular edema by 50–60% and severe visual loss in proliferative diabetic retinopathy (PDR) by 90% .[8]

This preliminary study was therefore undertaken to study the change in retinal sensitivity in central 30 degree of retina with test applied Visual Field Automated Perimetry (Humphrey field analyser SITA standard 30-2 test) in the diabetic patient.

MATERIAL & METHOD

The present cross sectional observational study comprising of 84 cases was conducted in the Department of Physiology, Pt. Jawaharlal Nehru Memorial Medical College Raipur in collaboration with the Upgraded Department of Ophthalmology, Dr. B.R.A.M. Hospital, Raipur (C.G.) from August 2014 to July 2015. Study subject were selected by simple random sampling, those fulfilling inclusion criteria. In the study, individuals was comprised in two different group i.e. Type 2 diabetic patients (Case) and normal healthy (Control) of age 30 years or older. Objectives & method of the study was explained & an informed consent was taken from the subjects prior to the start of study. Subjects were interviewed about name, age, occupation, education, tobacco & alcohol intake, residence and proformas were filled before eye examination. Detailed clinical history was recorded. All patients underwent complete clinical examination including blood pressure, general & systemic examination including neurological examination. 42 eyes were examined in each group one eye per patient was assessed in all subjects. The person with one eye, same eye was examined whereas person with two eyes the better one was selected by ocular examination. Eye examination includes Best-corrected visual acuity, refraction, intraocular pressure, Slit lamp examination & Humphrey Visual Field Automated

Perimetry 30-2 test were performed.

Sample size: - Sample size for cross section observational study was calculated
By Comparing Two Independent Proportions

$$\text{Patient per group} = \frac{f\,(\alpha,\beta)\,\{P1(1-P1)+P2(1-P2)\}}{(P1-P2)2}$$

D.K. Nagi, et.al. (1997) conducted a prospective study to determine Diabetic Retinopathy assessed by fundus photography in Pima Indians. In a population-based epidemiological study, 991 Pima Indians with non-insulin-dependent (Type2) diabetes mellitus (NIDDM) and 288 without diabetes adult were examined. Defect in Visual field was present in 375 (37.8%) diabetic subjects and 14 (5.2%) non-diabetic subjects.

Assumptions:

p1 = 0.37 (37.8% retinopathy in diabetics)

p2 = 0.05 (5.2% retinopathy in non diabetics)

90% power, 5% significance [f (α, β) = 10.5]

Then

$$\text{Patient per group} = \frac{(10.5)\{0.37\,(1-0.37)+0.05\,(1-0.05)\}}{(0.37-0.05)2}$$

42 subjects was selected separately for both group those fulfill inclusion criteria for the study. The one eye with better refraction & visual aquity was selected for perimetry examination from each subject.

Participants

Group 1: Case group

Persons aged 30 years or older with established diagnosis of Type 2 diabetes mellitus or patient on antidiabetic medication and willing to participate.

Group 2: control group

Person aged 30 years or older nondiabetic and willing to participate

Exclusion Criteria:

- Best corrected visual acuity of less than 6/60 on the Snellen Scale in test eyes

- Refraction more than ±5 D

- Cataracts: nuclear opalescence, nuclear colour and cortical cataract more than grade three. Those with a posterior sub capsular cataract and cataract in the pupillary area even of grade 1 were excluded.
- Known case of previous laser photocoagulation, PDR with sequel (vitreous hemorrhage and tractional retinal detachment), intraocular surgery, and eye disorder that could cause visual field defect (corneal opacity/ media opacity).

- Intra ocular pressure of 22 mmHg or more & glaucoma.
- Vision loss after head injury, or neuro-ophthalmic disorders.
- Blood pressure >140/90 mmHg.
- Sickle cell disease.

Data was compiled in MS-Excel and checked for its completeness and correctness then it was analysed using suitable software and p-value < 0.05 was considered as statistically significant.

RESULTS

TABLE 1: AGE AND SEX WISE DISTRIBUTION OF CASES AND CONTROL

Age in years	Case			Control		
	Female	Male	Total	Female	Male	Total
30-40 Yr.	6	3	9	11	13	24
41-50 Yr.	6	8	14	3	2	5
>50 Yr.	4	15	19	4	9	13
Total	16	26	42	18	24	42
Mean age	45.81 ± 9.01	53.69 ± 10.69	50.69± 10.69	40.72± 10.04	43.42± 12.04	42.26± 11.17
P value = 0.0007, t = 3.5336, df = 82, SE = 2.386						

Mean age of diabetic was 50.69± 10.69 years in which male was 53.69 ± 10.69 years and female was 45.81 ± 9.01 years. This age difference were statistically significant (P=0.0184). Out of 42 non-diabetic or control 13 males belong to 30-40 year age group, 2 belong to 41-50 age group and 9 males were more than 50 years of age. Among females 11 belong to 30-40 year age group, 3 belong to 41-50 age group, 4 females were more than 50 years of age. Mean age of control was 42.26± 11.17 years in which male was 43.42± 12.04 years and female was 40.72± 10.04 years. The age difference between case & control were statistically significant (P value = 0.0007). **[Table-1]**

TABLE-2: DISTRIBUTION ACCORDING TO RANDOM BLOOD SUGAR LEVEL

Blood Sugar Level	Case(42)			Control(42)		
	Male	Female	Total	Male	Female	Total
Mg/dl Mean ± SD	175 ±48	185 ±29	179 ±42	122 ±12	127 ±12	124 ±12
T test P<0.0001, t = 8.1589, df = 82, SE = 6.755						

The random blood sugars in diabetic case were 179 ± 42 mg/dl and control were 124 ± 12 mg/dl of blood which was statistically significant (P< 0.0001) **[Table-2]**

TABLE-3: DISTRIBUTION OF CASE AND CONTROL ACCORDING TO AGE AND VISUAL FIELD

| Age in Years | Visual Field | | | | | |
| | Case | | | Control | | |
	Defect	Normal	No. of eyes	No. of eyes	Normal	Defect
30-40	6	3	9	24	23	1
41-50	7	8	15	5	5	0
>50	10	8	18	13	10	3
Total	23	19	42	42	38	4
Mean age	53.5±11.3		50.7± 10.6	42.3 ±11.17		52.6 ±15.6
T test P value = 0.88 t = 0.15, df = 25, SE= 6.437						

In diabetic case, 6 out of 9 people of age between 30 -40 years showed field defect in which 2 were male and 4 were female. 7 out of 15 people between ages of 41-50 yrs. had field defect in which 5 were male and 2 were female. 10 out of 18 people between ages of more than 50 yrs. had field defect in which 8 were male and 2 were female. Mean age of case with field defect was 53.55±11.28 yrs. male aged 53.5±10.9 yr and female aged 45±9.7yr. This was statically not significant (p=0.62). In control group 24 people of age between 30-40 years, field defect was present in only 1 people and 3 out of 13 control of having age more than 50 year had field defect. Mean age of case with field defect was 53.55±11.28 yrs while control was 52.57±15.6 years. This age difference was not statistically significant (P = 0.8802).

This table makes us to conclude that in control group field defect was present in advanced age but in diabetic cases field defect present even in younger age. **[Table-3]**

TABLE-4: DISTRIBUTION OF CASE AND CONTROL ACCORDING TO SEVERITY OF FIELD DEFECTS (MEAN DEVIATION) AND AGE

| MD | Case | | | Control | | |
p value	Eyes(42)	Mean age	Deviation (dB) -7.5 ±5dB	Eyes(42)	Mean age	Deviation (dB) -3± 2.3dB
<.5%	27	52 ±10	-9.7±5	3	60 ± 4	-10± 4
>.5%	15	48 ±11	-3.3 ±1.3	39	41± 10	-2.5± 1.1
T test. P < 0.0001, t = 4.5088, df = 82						

In 42 diabetic cases, the Mean Deviation was -7.5 ±5dB. The Mean Deviation p values was less than 0.5% in 27 eyes having mean age 52 years and rest of 15 eyes having mean age 48 years showed greater than 0.5%. This age difference was statically significant (p<0 05). In control group, the MD p values was less than 0.5% in only 3eyes having mean age 60.33 years and rest of 39 eyes having mean age 40.87 years showed MD p values, greater than 0.5%. This age difference was statically significant (p<0 05). **[Table-4]**

TABLE-5: DISTRIBUTION OF CASE AND CONTROL ACCORDING TO SEVERITY OF FIELD DEFECTS (PATTERN STANDARD DEVIATION) AND AGE

PS D	Case			Control		
p value	Eyes(42)	Mean age	Deviation (dB)	Eyes(42)	Mean age	Deviation (dB)
<1%	25	49 ±10	7.8 ±3	5	52± 13	6.6±1
>1%	17	52 ±11	2.2±.5	37	41±10	1.8±.5
T test. P < 0.0001, t = 5.1224, df = 82						

Severity of field defects (MD and PSD) were statistically significant (P < 0.0001) in diabetic cases as compare to control group. **[Table-5]**

DISCUSSION

The results of the current study were also supported by **Abdul Khaliq et al. (2001)** [10]

Babatunde Ishola Adejumo et al. (2012) conducted a cross sectional study on 72 type-2 diabetic patients in which 32 were males and 38 were females. Mean age was 48.8 ± 9.09 . [11]

Mamatha B Patil and Nishkal Prabhu A Burji (2012) studied 50 asymptomatic patients with type 2 diabetes mellitus. In their study 6 cases were of age group 30-39 years, 10 cases were between 40-49 years of age, 20 from 50-59 year age group, 11 from 60-69 year age group and 3 were more than 70 years of age . [12]

Igben F Aigbe et al. (2012) studied one hundred and fifty adult type 2 DM patients with mean age of 55.4±11.6 years. [13]

Majid Abrishami et al. (2012) studied on forty eyes of diabetic patients and 34 eyes of the non-diabetic control group. [14]

Exiara, Konstantis, Papazoglou et al (2010) studied 114 outpatients with DM type 2, 48(42.1%) male and 66(57.9%) female with mean age of 44 ± 8.2 years. [15]

Hameedullah et al. (2010) conducted a study on 80 normotesive Type 2 diabetes during March 2007 to March 2008. Mean age was 53.5 years. There were 20 (47%) males and 23 females (53%) among subjects. [16]

M.S. Roy et al (1984) conducted a study on 22 insulin dependent diabetic patients. The mean age of women was 41.4 years & of the man was 50.6 years. [17]

Distribution of case and control according to severity of field defects

Severity of field defects (MD and PSD) were statistically significant (P < 0.0001) in diabetic cases as compare to control group in the present study. The present result was supported by **Klin M. A. (2003)**. [18]

Caroline K L Chee and Declan W Flanagan studied 30 of the 32 eyes (94%) with early proliferative diabetic retinopathy had obvious areas of reduced sensitivity on the greytone printout. The MD of these 30 eyes had p values of less than 5%. This means that only 5% of the normal age-matched population has an MD equal to or poorer than these patients. Nineteen eyes (59%) showed MD p values of less than 0 5%. The CPSD had p values of less than 10% in 31 eyes (97%), including all those with MD p<10%. Visual field defects were found to be more severe in the older patients. [19]

CONCLUSION

Retinal sensitivity tested by Humphrey field analyser (HFA) 30-2 test is simple, non invasive, reproducible, safe and easy to perform. Therefore by early diagnosis of diabetes and regular ophthalmic examination with preventive measure and early treatment we can retard the progression of retinopathy and its future consequences.

Source of Funding- None

Conflict of Interest- None

Ethical Clearance- Taken from institutional ethical committee.

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Short Term Memory Status by Visual Tasks using Words Test

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ABSTRACT

The Present study is an attempt to establish normal short term memory status by visual tasks in medical students. To evaluate the influence of gender and also to evaluate changes in short term memory status after application of some standard memory improvement methods. The process of learning is most essential to become academically more effective, and memory status plays an important role. Progressive decrease in memory status in higher trials of word test is due to increase in number of bits/ items more than seven as an individual can hold 7 ± 2 bits of information. Due to effectiveness of memory improvement methods, there was statistically significant improvement in memory status in all the subjects and more so in females.

Keywords- *Short term memory, Word test, memory status.*

INTRODUCTION

According to Yves Ledanseurs Weighing almost 1.5 Kg. with an astronomical number of neurons and billions of connections, the brain – the most crucial part of the CNS – controls every thing. Memory forms part of identity, intelligence and emotions of an individual[1]. Dennis L. Kasper said that Memory is the complex function of brain that uses several storage buffers of different capacity and duration[2].SM.Jhon.Walton Studied Ribot's law states that there is an inverse relationship between the strength of a memory and its recency i.e. old memories are better preserved; indeed, this is often observed at bedside[3]. Kenneth Davis suggested that Memory is the physical system used to store information during the learning process and to retrieve it when it is needed[4]. It was stated by Elaine Marieb R. N that Short term memory, also called working memory, is a fleeting memory of the events that continually parade before you[5]. So present study is an attempt to establish short term memory status in medical students, find out simple short term memory tests and evaluate changes in short term memory status after applying some standard methods for improvement of short term memory.

MATERIAL AND METHOD

Two hundred and one (201) young adolescent healthy undergraduate boys and girls of age group of 18 to 21 years studying in M.B.B.S of Al-Ameen Medical College Bijapur (Karnataka) were volunteers for this study. In Words test Subjects were given 30 seconds to look at a list of 15 words which were used commonly in daily life, like eggs, apple, chair etc[6]. Then the subjects were asked to recall all the words or what ever they remembered and ask them to write on a paper immediately. Results were expressed in percentage**.** Grouping method was used for improvement of words test. Here the subjects were asked to make a group of words (2 or 3) like a group of eatable products for example, eggs, banana, apple etc, group of parts of our body like brain, heart etc[1,7].

Statistical analysis:

Student's paired "t" test was used to analyze the memory status in all the subjects and in males and females separately before and after application of memory improvement methods.

'Z' test was used to compare the memory status of all the subjects and males and females separately for words test. The p value of ≤ 0.05 was considered as significant in both the tests.

RESULT AND DISCUSSION

Short Term Memory status by visual task before and after application of certain memory improvement methods by using Words test were done and analyzed (Table1, 2 and 3).

Present study is an attempt to establish short term memory status in medical students, to find out simple tests to assess short term memory and evaluate changes in short term memory status after applying some standard methods for improvement of short term memory. The mean of memory status before application of memory improvement methods was found to be numerically more in females than males, which was not significant statistically (p> 0.05). The decrease in memory status for words test may be due to several factors. The word recall will depend on its position in the list. If subjects attempt to recall the words immediately; they remember first few words and the last few best words. The better recall of the first items on the list is called a *primacy effect*, of the final items a *recency* effect[8]. Reading demands good eye sight, of course but also comprehension. It is a form of visual attentiveness to both the shape and sense of the words. Whatever the shape of the letters, one's attention is focused primarily on the meaning of the text rather than the typographic elements or correct spelling. And it is because a text makes sense that one can remember it. On the other hand, when one sees a text in a language one is unfamiliar with, one can pay attention only to the appearance of the words, to their shape. One can not really call this reading, and it would be impossible to remember the text[1]. In this study, 15 words with least of three letters to maximum of seven letters were displayed in the visual task. When words are displayed the visual image persists for less than 1.0 sec. The memory system used to hold this image has been called *iconic memory*[4]. George Miller argued that human short term memory has a forward memory span of approximately seven items or more accurately within the information theoretic single digit or letter, while an item can indeed be a single digit or letter, it can also be a whole number, word or abstract concept[9].A statistically significant (p< 0.001) improvement in memory status was observed in females than males after application of memory improvement method. Grouping method was used for improvement of words test. Here the subjects were asked to make a group of words (two or three) like a group of eatable products, parts of body ect.The memory

status in all the subjects was found to be increased and was statistically highly significant (p < 0.001) when compared to the memory status before application of memory improvement methods. The memory status in males was found to be increased which was statistically highly significant (p < 0.001) when compared to memory status before application of memory improvement methods. The memory status in females, like in males, was found to be increased and was statistically highly significant (p < 0.001) when compared to memory status before application of memory improvement methods. A statistically significant (p< 0.001) improvement in memory status was observed in females than males. The observed improvement in short term memory status for words test is suggestive of effectiveness of grouping method. Females showed statistically significant increased improvement in memory status when compared to males which may be due to effective and better utilization of grouping method.

Table1- Memory status before and after application of Memory improvement method

	MS	MSA
Mean	68.19	77.01
SD	14.35	14.99
SEM	1.01	1.06

(MS – Memory status, MSA - Memory status after application of Memory improvement method,

SD- Standard Deviation, SEM- Standard error of mean)

Table 2- The 'Z' and 'p' values of Male Vs Female Z-test of Memory status before application of Memory improvement method

	Z-value	p-value
Male Vs Female	1.38	p>0.05

Table 3- The't' and 'p' values of Student's paired't' test before and after application of Memory improvement method in all the subjects, male and female

All the Subjects		Male		Female	
t-value	p-value	t-value	p-value	t-value	p-value
10.35	P<0.001	5.81	P<0.001	9.27	P<0.001

CONCLUSION

Statistically there was no gender difference in short term memory status in words test. There was a statistically significant improvement in memory status in all the tests in all the subjects, male and females after application of memory improvement method like grouping method which may be due to effectiveness of this method. Females showed better improvement than males after application of memory improvement method which was statistically significant which may be due to effective and better utilization of memory improvement method.

Short term memory status by visual task appears to vary with the nature of the test. Short term memory status can be thus assessed by simple tests like alphabetical, numerical, words and object tests which can also be recommended to evaluate short term memory status in diseases affecting memory as bedside tests.

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Influence of Practice on Auditory Reaction Time in Young Adults

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ABSTRACT

Aim: The present study aimed to see the effect of practice, on Auditory Reaction Time (ART). Reaction is the purposeful voluntary movement to different stimuli. Auditory Reaction Time (ART) is time require to response to auditory stimuli.

Methodology: ART was measured by Inquisit lab (windows) released on in 2016 by millisecond software, Settle. During the ART test after variable time intervals the sound is placed for 30s to the participant through the speakers and subject has task to press the prescribed key as sound is played .All subjects were thoroughly acquainted with procedure. All subjects were analyzed before and after practice of task to know Auditory Reaction Time (ART). Reaction time was measured in two sessions. First include without practice of task and second was measured after practice of task. Result was statistically analyzed and recorded as MeanS.D. Student T-test was applied to check level of significance.

Result and Conclusion: In present study we found the ART was earlier and less after the practice of task. ART is decreased with practice. In daily life speed of reaction plays a large part to stay secure. Practice of ART is helpful for players, sportsmen, driving etc. it is helpful in protection of our body by responding from any harm.

Keywords and Abbreviations: *Auditory Reaction Time (ART), Practice, Reaction time (RT)*

INTRODUCTION

Reaction is a purposeful voluntary response to an external sensory stimulus. Reaction time is defined as period of time that elapses between occurrence of stimulus and initiation of movement[1]. Human body responds to various stimuli with different speed and gives a designed and purposeful movement. This plays a crucial role in everyday life as well as in emergency survival i.e., application of brake while driving as soon as possible when required. Auditory reaction time (ART) is the time required to respond for auditory stimuli. Reaction time became important component of information processing as it indexes spaces of stimuli, processing and response program[2]. RT is important physiological parameter to give information how fast and quick person responds Human RT works by having a nervous system recognize the stimulus. The neurons then relay the message to the brain. The message then travels from the brain to the spinal cord, which then reaches person's hands and fingers. The motor neurons then tell the hands and fingers how to react. The accepted figures for mean simple RTs for college-age individuals have been about about 160 ms for sound stimuli[3]. Concept of the reaction time of man appeared in science in the forties of the last century. Hermann von Helmholtz worked on nerve conduction velocity, a component of reaction time. He stimulated first one point of the nerve near to the muscle and then another point far from the muscle. The difference between the times from the stimulation of nerve to the muscle contraction in those

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two situations is the nerve conduction velocity. Later experiments were done to study the time taken for a specific response which was called reaction time[6]. By the practice of motor movements, muscular coordination and speed of movement can be improved which would improve movement time. Long lasting improvement in performing skilled motor movements can be achieved by training and retraining and repeated practicing[7].

RT IS having two component[4].

1.Mental processing time (MPT)-Time is required to perceive stimulus, Identifying and analyzed of stimulus ,finally deciding the proper motor response.

2.Movement time(MT) -time require from selection of response to perform the movement.

Luce and Welford described three types of reaction time[5].

1. Simple reaction time: Here there is one stimulus and one response.

2. Recognition reaction time: Here there are some stimulus that should be responded to and other that should not get a response.

3. Choice reaction time: Here, there are multiple stimulus and multiple responses.

In addition auditory sense faster than other any other sense, Sound causes hair cells in your ears to wiggle. This directly causes ion channels to open or close. No diffusion. Auditory signals are really fast and useful in our daily routine life such as during driving, during sports, during walking on roads , in medical practice, students to respond during some activities. Hence the present study aimed to see the effect of practice on auditory reaction time.

METHODS AND MATERIALS

The study was carried in K.D. Medical college. Mathura U.P. India. The study was conducted in 50 healthy male undergraduate students in age group of 18-22 years. Informed consent was obtained and purpose of study is clearly explained to all participants. Information about personal and medical history obtained to rule out any medical or surgical disease which would affect RT of identically by predesigned format. All individuals were given separate file with unique code in order to

access data after the test.

In this study ART of all individual was measured by increased 4.0 lab Inquist lab (windows) released on in 2016 by millisecond software Settle. The participants are clearly instructed about the performance of ART task. In ART task the sound is played for 30 sec through speakers with various intervals to the participant. By default randomly chosen time intervals from 2000 ms, 3000 ms, 4000 ms, 5000 ms, 6000 ms, 7000 ms, 8000 ms will be played The participant asked to press space bar key when sound is played.

Task was performed in two sessions. In the first session sound was played for five times. Mean was calculated to measure ART for all participants by excluding first and last reading. In second session participants were given practice of task for 15 min and after 5 min rest then sound was played for five times. Mean was calculated to measure ART for all participants by excluding first and last reading. Data for ART before practice and after practice of participants was collected and analyzed by using graph pad software (student t-test). Observations was taken significant *P*-value less than 0.05.

RESULT

ART measured in seconds. ART was found to be significantly(p0.05) less in after the practice session when compared without practice session for ART table no.1.

Table 1: Difference in Auditory reaction time in before the practice session and after the practice session:

ART before practice session (n=50)	ART after practice session (n=50)	*P* value
M=228.80	M=202.05	0.004

ART- Auditory reaction time, N- number of participants, M- Mean value.

DISCUSSION

In the present Study we found that ART was less after practice and performance of task in comparison to before practice. By the practice of an important task time required for stimulus identification and response can be

decreased. Tripp showed that reaction time in specific movements improves as a result of extensive practice of those concerned movements[9]. Our work has been supported by many other research works as Long-lasting improvement in performing skilled motor movements can be achieved by training and retraining and repeated practicing.People can acquire new motor skills and improve them with practice.[12] Learning of motor skill practice influenced on information processing.[8] With repetition of motion, person's conscious effort is decreased and the motion becomes more and more automatic.[13] Motor circuits of basal ganglia play a key role in the automatic execution of motor tasks.[14] Practice is an activity related to the nervous system and it can have a direct influence on memory and so it results in progress in performance.[17] Mental imagery and practice is an activity related to the nervous system and it can have a direct influence on memory and so it results in progress in performance.[18] Sanders (1998, p. 21) cited studies showing that when subjects are new to a reaction time task, their reaction times are less consistent than when they've had an adequate amount of practice. Also, if a subject makes an error (like pressing the spacebar before the stimulus is presented), subsequent reaction times are slower, as if the subject is being more cautious [16].

Kemp el al., showed that an auditory stimulus takes 8-10 milliseconds to reach brain that implies that faster the stimuli faster the reaction time to stimulus.[8] There are several possible explanations for this such as faster central nervous system processing speed, better muscular coordination with improved performance in the speed and accuracy task[15]

CONCLUSION

Our study concludes that Auditory Reaction Time (ART) decreases with practice can improve the person to react faster when necessary. This information is helpful for daily routine working life while driving to control vehicle by listening the sound, while playing sports for attention and quick response of sportsmen, while listening the class practice is important and during clinical. Practice is important for betterment of life. Reaction time plays a large part to stay secure in daily life.

Ethical approval : Institute's Research council and Ethics committee

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Dyslipidemia among Type II Diabetes Mellitus Patients

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ABSTRACT

Background: T2DM often have both quantitative and qualitative abnormalities of lipoproteins that are responsible for increased incidence of microvascular and macrovascular complications. Incidence of coronary heart disease is three to four folds higher in patients with type 2 diabetes mellitus compared to non diabetics. It has been proposed that the composition of lipid particles in diabetic dyslipidemia is more atherogenic than other types of dyslipidemia. **Aims & Objective:** Evaluate the changes in lipid profile level in diabetes and non diabetic patients. **Method:** This study was conducted on 100 subjects (50 T2DM patients with history more than ten yrs diabetes and 50 non diabetic control) with the age group of 40-60 yrs. Fasting plasma glucose and different Lipid fractions were estimated using standard procedure. All values were expressed as mean ± S.D. Statistical significance of differences between control and study groups were evaluated by student's t test. A p-value less than 0.05 were considered as significant. **Results:** The serum total cholesterol, LDL cholesterol and triglycerideswere significantly raised where as the level of HDL cholesterol was significantly

lower in diabetic subjects as compared to control. **Conclusion:** Dyslipidemia is a common finding among DM patients. DM patients should be screened and appropriate management should be instituted to reduce the risk of CHD and atherosclerosis.

Keywords : Diabetes, Lipid Profile, Dyslipidemia

INTRODUCTION

Diabetes mellitus is a heterogeneous chronic metabolic disorder characterized by hyperglycemia and its lethal complications. Among the various types of diabetes, Type2 diabetes mellitus (T2DM) is the most prevalent variant and it is due to combination of insulin resistance and relative insulin deficiency due to pancreatic β cell failure. T2Dm often have both quantitative and qualitative abnormalities of lipoproteins that are responsible for increased incidence of microvascular and macrovascular complications.[1]Patients with type-2 diabetes have increased risk cardiovascular disease associated with the risk for atherogenic dyslipidaemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide.[2] Insulin deficiency causes excessive metabolisation of free fatty acids, this may lead to a disorder in lipid metabolism. Insulin is a hypoglycemic hormone secreted from β-cell of the islet of pancreas. Insulin also has an effect on lipid metabolism.[3] In particular, the following processes are affected: apoprotein production, regulation of lipoprotein lipase, action of cholesterol ester, transfer proteins and hepatic and peripheral actions of insulin.[4] Even more, it has been proposed that the composition of lipid particles in diabetic dyslipidemia is more atherogenic than other types of dyslipidemia. [5,6] Low HDL-C was a major risk factor had emerged from the Framingham Heart Study. Total cholesterol (TC): HDL-C ratio (>4.5) is considered the most powerful predictor of coronary heart disease. LDL is the most important proatherogenic lipoprotein.

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Endothelial dysfunction occurs due to increased LDL-C and decreased HDL-C levels. [7] In view of the present scenario, this work was taken up to study the lipid profile status in patients who were type 2 diabetics and compared with a control group who were non diabetic.

MATERIALS AND METHOD: This cross sectional study was conducted on 100 subjects attending Medicine OPD at Navodaya medical college. Institutional ethical clearance was taken. An informed consent was taken from every patient after full explanation of procedure.

Inclusion Criteria: Patients /controls age group of 40-60 yrs were included in the study.

Out of 100 subjects, 50 subjects with history of 10 years type 2 diabetes mellitus (group I) and 50 volunteers having normal blood sugar level were selected as control(group II) .

Exclusion Criteria:

Diabetic patients with overt complications like neuropathy, nephropathy, retinopathy, and ischemic heart disease.

Patients with acute complications like diabetic keto-acidosis, non ketosis hyperosmolar coma and hypoglycemia.

Patients with any concurrent illness like chronic liver disease, hypothyroidism.

Patients on drugs like diuretics, steroids, oral contraceptives and beta blockers etc

Procedure : . After an overnight fasting of 10-12 hours, about 5 ml of whole blood was collected via vena puncture with the help of a disposable syringe in between 7.00am and 8.00am. Different Lipid fractions were estimated along with fasting plasma glucose. Glucose-detected by enzymatic reaction (glucose oxidase and peroxidase=GOD-POD). [8] Serum total cholesterol was determined by an enzymatic (CHOD-PAP) colorimetric method. [9] Triglycerides were determined by an enzymatic (GPO-PAP) method.[10] HDL-Cholesterol was estimated by a precipitant method. [11] LDL-Cholesterol was estimated by using Friedewald formula. [12] LDL-Cholesterol = Total Cholesterol – (HDL cholesterol + Triglycerides/5).

Statistical analysis : was carried out using standard deviation and chi-square test from which 'P' value is derived. The 'P' value less than 0.05 was considered significant.

RESULTS

This study was conducted on 50 type 2 diabetes patients and 50 age matched controls. Serum total cholesterol, LDL cholesterol and triglycerides were significantly raised (p<0.0001) in diabetic subjects compared to non diabetic subject & HDL cholesterol was significantly lower (p<0.0001) in diabetic subjects as compared to control (Graph No.1)
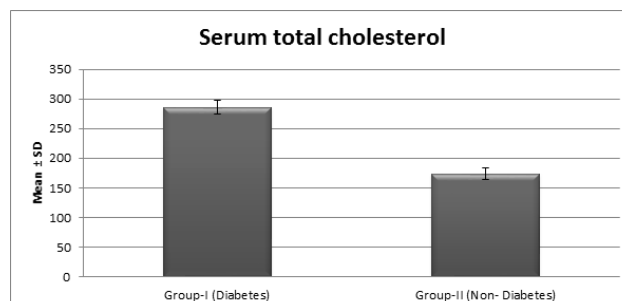
Graph No: 1.Association between Serum total Cholesterol level and Diabetes
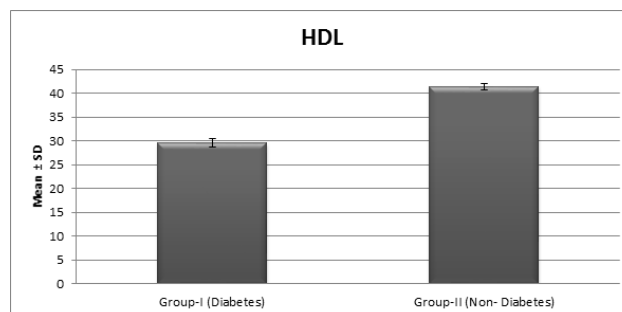
Graph No: 2. Association between HDL levels and Diabetes
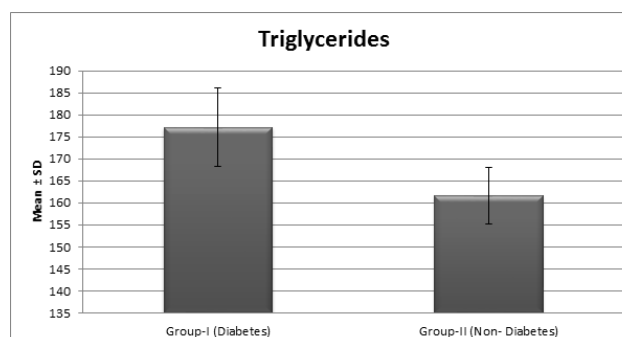
Graph No: 3. Association between Triglycerides levels and Diabetes

Graph No: 4. Association between LDL levels and Diabetes

DISCUSSION

ADA (American diabetic association) and AHA(American heart

association) have declared that diabetes is considered a coronary artery disease (CAD) equivalent and patients should be started on treatment for secondary prevention of CAD.[13]According to guidelines of the ADA and the AHA, the target lipid values in diabetic individuals (age >40 years) without card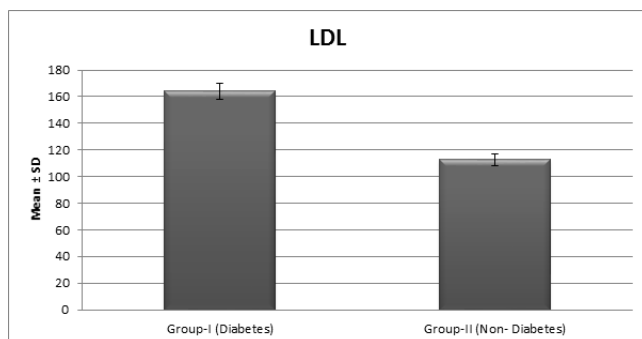iovascular disease should be as follows: LDL < 2.6 mmol/L (100 mg/dL); HDL >1 mmol/L (40 mg/dL) in men and >1.3 mmol/L (50 mg/dL) in women; and triglycerides <1.7 mmol/L (150 mg/dL). In patients >40 years, the ADA recommends addition of a statin, regardless of the LDL level in patients with CHD(coronary heart disease) and those without CHD, but who had CHD risk factors The present study comprised of a random sample of population,which has been selected on strict criteria based on including non obese non diabetic and normotensive volunteers as control. A strong clustering risk factor for coronary artery disease has been observed in diabetic subjects. These observed increases and decreases in serum lipid profile associated with Diabetes mellitus are in agreement with finding of Ononogbu [14], Uddinand Miah[15] , Sccopla et al.[16], Adedeji and Onitiril.[17] In diabetes many factors may affect blood lipid levels, this is because carbohydrates and lipid metabolismare interrelated to each other if there is any disorder in carbohydrate metabolism it also leads disorder in lipid metabolism so there is high concentration of cholesterol and triglycerides and due to this there is reduction in HDL cholesterol levels. Hypertriglyceridemia predisposes the patients to life threatening complications like diabetic ketoacidosis, coronary artery disease and lipaemia retinalis.[18] Sharma (1970) and Jain (1980) observed increase in the levels of serum total cholesterol, serum triglycerides, and serum phospholipids in diabetic subjects when compared

to normal controls.[19,20] Gambhir et al found that low HDL-C were independent risk factor for premature coronary artery disease. [21]

CONCLUSION

Dyslipidemia is the commonest complication of diabetes mellitus and it predisposes to premature ahterosclerosis and macrovascular complications. Common lipid abnormalities in diabetes are raised triglycerides, LDL-C serum cholesterol and low HDL-C. As diabetes is a disease of self management, appropriate nutrition (low calories, low carbohydrates, and low fat with high fiber diet) regular physical activity and proper medication to achieve good glycaemic control have to be followed. HMG CoA Reductase inhibitors (statins) should be used to achieve LDL goals.[22] Life style modifications like regular exercise, quitting smoking and alcohol along with yoga will help the diabetic patients to live a better life.

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Variations in Respiratory Movements in Normal Subjects based on the Type of Chair Used

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ABSTRACT

BACKGROUND : Sitting is the main everyday 'activity' of contemporary people.In In 1997,the number of hours spent weekly on computer was 5.9 ,whereas in 2003 it reached 14.6 per week. The latest research confirms the significant impact of the sitting posture on the respiratory system. The aim of this study to compare the respiratory chest movements based on the type of chair used.

AIMS & OBJECTIVES:

1.Comparison of respiratory amplitudes in females in chair 1 and chair 2

2.Comparison of respiratory amplitudes in males in chair 1 and chair 2

3. Comparison of respiratory amplitudes(in males & females) in relation with weight.

MATERIALS & METHOD: The present study was conducted in the Research laboratory, Dept. of Physiology, RVMIMS, Laxmakkapally, Siddipet. A total of 60 subjects were selected (30 males & 30 females) between age group 17-25 years. Respiratory movements and weight were recorded. Respiratory movements were recorded using stethograph (respiratory belt) and Weight using weighing machine.The study covered respiratory chest movement assessment of the subjects in two different chairs.

RESULTS: All measured values were statistically analyzed using WindowStat software. Paired t- test analysis and ANOVA has been used to find out the significant p. Amplitudes for the first chair (298.4mV) reached a higher average level than for the second one (268.9mV).The study did not show correlation between body weight and respiratory amplitudes in first chair and second chair.The comparison clearly shows a higher respiratory amplitude for females(300.3±36.9) in first chair as compared to men(296.5±43).

CONCLUSION: The study results conclude that there is a considerable change in the chest respiratory movements depending on the orientations of joints and muscle activation. Respiratory movements in chair 1 (upright position) are higher than chair 2 (slumped position). Thus an emphasis should be made on changing the seats' physical activity and its effect on respiratory system.

Keywords: Respiratory movements, respiratory amplitudes, chair.

INTRODUCTION

Altered body position influences the respiratory muscle strength and function in healthy adults[1].Sitting

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is the main everyday activity of contemporary people. People sit when driving a car, waiting for an appointment with a physician and most frequently , working at a desk and a computer[2]. In most cases, typical sitting postures observed today are incorrect and produce several pain syndromes of the motor system[2].

Respiration means the occurrence of exhalation and inhalation in turns and the lung undertakes the role of exchange between air and blood[3].This happens through respiratory muscles and their neurophysiological

control. The diaphragm is used as the main muscle for inhalation and rectus abdominis, internal oblique, external oblique and transverse abdominis muscles are used for exhalation[4].Respiratory functions are correlated to posture change[5-7].Changes in posture can affect the resting length of respiratory muscles according to Mori et al[8].

A well-functioning respiratory system is the basis of well-being of the whole body. Any deterioration of the respiratory function decreases oxygen saturation of human cells, affecting not only the physical , but also the mental condition. A number of research studies have confirmed the impact of body posture on the respiratory system, chest and diaphragm mobility, as well as on the number and quality of inhalations and exhalations[9,10]. The connection between posture and lung performance has proved significant[11].For example, the prone position in healthy subjects has been shown to cause compression of the anterior ribs, which limits the volume of air into the lungs and the ability to expel air out of the lungs[12].

Respiratory efficiency and change in respiratory functions reflect lung volume movement injury, asymmetry and muscle paralysis[13]. Under physiological conditions, the diaphragm falls during inhalation and rises during exhalation. An inclined position prevents proper functioning of this muscle, resulting in increased activity of the upper respiratory duct[14].

In view of this trend , it is obvious that the type of chair is a factor of major impact on people's health and work comfort. According to Donkin, a chair shapes a body posture and represents a physical support allowing for efficient performance and implementation of tasks[15]. Incorrect sitting posture impairs both the static and the dynamic balance of the pelvis and the spine[2].The most suitable chair with proper positioning should secure appropriate respiration.

The aim of the study is to confirm the variations in respiratory movements based on the type of chair used. The evaluated measure is the amplitude of respiratory movements on different types of chairs.

MATERIALS & METHOD

SUBJECTS:

A total of 60 subjects from RVM institute of Medical Sciences , Laxmakkapally, Siddipet Dist were selected.

1.30 males

2.30 females

Age group: 17-25 years

INCLUSION CRITERIA:

1.Age group including males and females between 17-25 years

2.Body weight ranging 52-87kg

EXCLUSION CRITERIA:

1.History of respiratory disorders

2. History of chest deformities

3. History of postural defects

PLACE OF STUDY:

The present study was conducted in Research laboratory, Dept. of Physiology, RVMIMS, Laxmakkapally ,Siddipet.

Respiratory movements and weight were recorded after obtaining informed consent from all the participants after approval from Ethical committee.

RESPIRATORY MOVEMENTS RECORDING:

EQUIPMENT:

Respiratory movements were recorded using stethograph (respiratory belt) and analysed using BIOCHART software version 1.0 provided by BIOSTAR INDIA.

RECORDING PROTOCOL:

The study covered respiratory chest movement assessment of the subjects in two different chairs.

The subjects were familiarized with the testing equipment and the procedure was explained.

1.First chair : Fixed chair, with no possibility to adjust. The position in the first chair is defined as sitting in a chair with the trunk extended and the hips and knees flexed as near as possible at right angle(upright position).

2.Second chair : Movable seat and back rest. The second chair is allowing the pelvis to be positioned in the middle of the seat with the trunk reclining posteriorly

against the back rest(slumped position).

Stethograph (respiratory belt) was tied around the chest of the subject.

Weight was recorded using weighing machine.

The study was conducted after rest of 10 minutes. The subject was asked to take a seat in the consecutive chairs and regulate breathing. Throughout this time, breathing was recorded. When breathing became regular, the subjects were asked to read a text. For the purpose of analysis two-minute record of regular, calm breathing while reading was chosen.

RESULTS

All measured values were statistically analyzed using WindowStat software.

Paired t- test analysis and ANOVA has been used to find out the significant p value.

The analysis of the data comparisons show the respiratory amplitude of first chair (298.4mV) and for second chair (268.9mV).In that case , amplitudes for the first chair reached a higher average level than for the second one. The difference noted is statistically significant(p=0.00)

In the present study, there is no relevance of body weight to respiratory amplitudes in first chair and second chair.

The comparison clearly shows a higher respiratory amplitude for females(300.3±36.9) in first chair as compared to men(296.5±43).

1.RESPIRATORY AMPLITUDES OF FEMALES IN CHAIR 1 AND CHAIR 2:

2.RESPIRATORY AMPLITUDES OF MALES IN CHAIR 1 AND CHAIR 2:

3.RESPIRATORY AMPLITUDES IN RELATION WITH WEIGHT:

	AMPLITUDE(mV) Chair 1	AMPLITUDE(mV) Chair 2	X1 - X2	
Mean	300.300	267.300	33.000	
Std. Error	6.738	4.592	4.119	
Std. Deviation	36.905	25.154	22.560	
Variance	39498.410	18348.398	14760.000	
Pooled s²			997.359	
t-Test		Prob	0.000	***

Before	Mean	Std.Dev.	After	Mean	Std.Dev.	Before-After	Paired t-test	Probability
AMPLITUDE(mV) Chair 1	296.500	± 43.184	AMPLITUDE(mV) Chair 2	270.633	± 32.570	25.867	9.514	0.000 ***

Source of Variations	df	Sum of Squares	Mean Squares	F Ratio	Probability
WEIGHT(Kg)	1	13.181	13.181	0.008	0.929
Groups	1	281.208	281.208	0.171	0.680

DISCUSSION

Sitting posture is an integral part of our life. Incorrect sitting posture maintained for a longer period of time may be a cause of many motor disturbances[16]. Latest research confirms its impact on respiratory system. The present study aimed to compare the amplitudes of respiratory chest movements based on the type of chair used. It is confirmed that our different postures are shaped by our trunk muscles' activity, which affects the changeable activity of the ribs and abdomen[17,18] . Biomechanical alteration of postural alignment affects the ranges of motion, position and coupling patterns of the articulations between the thoracic spinal vertebrae and ribcage, which influence lung compliance via changing articular movement available for breathing[19]. The diaphragm has several attachments to spinal vertebrae and ribcage and changes in the position of these bony structures altered the proper functioning of the diaphragm. Restriction of the rib cage during slouched position limits the mobility of the diaphragm[20,21].

A 'stooped' posture results in a lack of proper diaphragm working space, which stimulates the upper respiratory duct, overloading the auxiliary inhale muscles. Such a person would raise their shoulders during inhalation[14]. In young healthy subjects with a normally positioned diaphragm, the stooped sitting posture results in increased intra-abdominal pressure by approximating the ribs to the pelvis, making it difficult for the diaphragm to descend caudally during inspiration[22].Duru et al reported that sitting caused an increased compression of abdominal viscera and limitation of downward movement of the lungs[23].In addition, placing the head and neck in proper alignment reduced airway obstruction, which helped to increase pulmonary function[24].Adapting a stooped position reduces the ability of the diaphragm to generate appropriate force for the abdominal cavity. This is supported by a number of studies which demonstrated an alteration of the ribcage and the diaphragm strength force during different positions[21,25]. This position is detrimental to both spinal alignment and respiratory function. In addition, stooped position contributes to impairment of other systems including reduced venous return, autonomic nervous system and phrenic nerve excitability. Similar to this study, previous studies have reported an increased respiratory effort and reduced respiratory capacity and control in normal individuals in a stooped position compared to normal erect sitting position. Facilitating a normal breathing pattern needs an effective diaphragm muscle contraction[22].

Present study confirms that the chair type used for our work has an impact on chest movements[20,22,26]. Our results are confirmed by papers published by Morl. The author states that an individual sitting in a chair in prone to a slump position, results in flattening of lumbar lordosis and posterior pelvic tilt[27]. The second chair decreased thoracic duct activity as compared to the first one. In addition, this chair enabled increased abdominal activity. In chair without seat adjustment, lumbar lordosis decreased despite support[28].

Russos and Koutsoukou proved that obese individuals need more energy to perform respiratory activity with decreased system efficiency[29]. Present research results did not show any relationship between the subjects' body weight and respiratory system function in relation with type of chair used. Studies have documented that women more commonly used the thoracic duct when sitting in a comfortable chair as compared to men[30].

CONCLUSION

Changes in respiratory movements in chair 1 and chair 2 showed differences in chest mobility. These differences regarded the sitting posture probably affects respiratory patterns. This can be used as an indicator for respiratory chest movements which enables people to both work and relax.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance –taken from Institutional Ethical Committee

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Gender Variations in Electrodermal Activity among Medical Students in Response to Cold Pressor Test

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ABSTRACT

Objectives : To evaluate & compare the electrodermal activity(EDA) among males and females in response to cold pressor test.Thus know the differences in autonomic functions in males & females.

Materials & Method: In this experimental study Galvanic skin response(GSR) was the parameter measured for EDA. The sample size of our study was 70 MBBS students (35 males & 35 females)

Cold pressor test was performed by immersing hand in cold water (temp 4°C to 6°C) &changes in electrodermal activity(GSR) was recorded by using Biochart (version 1.0) device in our research lab.

Results: There was a significant increase in GSR after immersion of hand in cold water both in males and females. The baseline GSR value, GSR after immersion in cold water & the recovery GSR value were significantly higher in males compared to females.

Conclusion: There is substantial evidence of gender difference in the functioning of the autonomic system , including specific effects of both male & female sex hormones. As a generalisation, at least in humans there is a preponderance of sympathetic mediated responses in males and of parasympathetic in females.

Our data show that EDA(GSR) is such a simple and non invasive method that can be used reliably to measure the autonomic nervous system functions i.e., the sympathetic over activity during cold induced acute pain.

Keywords : *electrodermal activity,galvanic skin response, sympathetic, parasympathetic*

INTRODUCTION

The history of research into Electrodermal activity,which has been thoroughly reviewed by Neumann & Blanton , dates back to experiments performed in 1849 by Dubois – Reymond in Germany. The first experiment that showed a connection between sweat gland activity & current flow in skin was performed in Switzerland by Hermann & Luchsinger(1878).Three years later Hermann found that areas with stronger sweating such as palms and fingers showed greater skin current than other bodysites such as the wrist and elbow regions, which pointed to the importance of human sweat glands in electrodermal phenomenon[1].

Electrodermal activity is the property of the human body that causes continuous variation in the electrical characteristics of the skin. Historically , electrodermal activity has also been known as skin conductance,galvanic skin response(GSR), electrodermal response(EDR), Psychogalvanic reflex(PGR), skin conductance response (SCR) & Sympathetic skin response(SSR) &Skin conductance level(SCL)[2,3,4].

Skin conductance is not under conscious control. Instead, it is modulated autonomously by sympathetic activity. These autonomic sympathetic changes alter

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sweat and blood flow,which in turn effects GSR. The amount of sweat glands varies across the human body,being highest in hand and foot regions (200-600 sweat glands /cm2)[5]

Skin conductance is determined by the number and activity of sweat glands & their activity is stimulated by the sympathetic nervous system[6,7,8,9,10]

The autonomic nervous system is of importance in the natural history and treatment of number of pathophysiological states involving the CVS.These include HTN & diseases of vasculature as well as myocardial ischemia and cardiac arrhythmias[11]

An appreciation of gender differences in the structure and function of ANS is important to a full understanding of a number of common & important clinical presentations[12]

There are three different methods of measuring EDA : a) without the application of an external current,which is therefore called the endosomatic method and two exosomatic methods which either a) apply direct current (DC) via electrodes on the skin or apply alternating current (AC).The measurement of EDA as skin conductance using a DC,constant voltage methodology with silver – silver chloride electrodes and an electrolyte of sodium or potassium chloride has dominated the EDA literature for many decades.The measurement of exosomatic EDA with DC using a constant voltage system,the most widely applied method[13]

In most of the cases GSR is measured using a part of the skin having a lot of sweat glands.The skin on the palm or volar surface of hand contains 2000 sweat glands/ cm2.GSR measurement is relatively simple& has a good repeatability. Therefore the GSR measurement can be considered to be simple & useful tool for examination of ANS function especially the peripheral sympathetic system[14]

It uses just two electrodes which are placed on the fingers and act as if they were the two terminals of one resistance[15,16]

Immersion of limbs in cold water has long been known to induce pain.On immersion of hand incold water,there is an initial sensation of cold followed by pain,which rapidly increases in intensity reaching a maximum within about a minute[17]

The evaluation of of pain intensity has to rely on the patients self assessment.Therefore one may fail to assess pain intensity correctly in small children,unconscious or delirious patients[18,19,20,21].When patients cannot verbally communicate the pain , a fast reacting,objective,sensitive, specific and continuous method to monitor pain is needed[22]

When pain is experienced ,sweat glands are stimulated by sympathetic excitatory efferent neurons & sweat is released within 1-2 s whereby skin conductance increases due to decrease in skin resistance[6,22]

MATERIALS AND METHOD

This study was done in Research lab,Department Of Physiology,RVM Institute of medical sciences and research centre,during January 2018 to April 2018.70 healthy medical undergraduates including 35males&35females of 18-23years age group were included as subjects for this study.Subjects with H/O cardiovascular,respiratory abnormalities,H/O local pain or inflammation,H/O nerve injury to upperlimb were excluded from the study.

The protocol was approved by the Institutional Ethical committee.All participants were provided a written informed consent before the study related procedure.

PROCEDURE :

Each subject was called to the research lab,asked to sit & relax for 3-5min.Silver chloride electrode probe was used as a transducer to measure galvanic skin response. In this probe two sensors are attached with single cable. The two sensors are placed over the tips of index and middle fingers of dominant hand.Initially heart rate & Blood pressure of the subject were recorded.Three GSR values are recorded&analysed using BIOCHART software version 1.0 through physiograph.

1st recording :After the subject relaxes for a period of 3-5 min baseline recording at rest is taken for 1-2 minutes & GSR is noted.

2ⁿᵈ :With intact skin electrodes the subject is asked to immerse his / her dominant hand in cold water (temp 4-6°C)for a period of 2-4min & GSR value is noted.

3ʳᵈ : The subject is asked to remove hand from cold water&after a gap of 2min recovery GSR is recorded.

RESULTS

TABLE:1 – GSR-TWO WAY SUMMARY

	GSR (kohm) Male		GSR (kohm) Female	
GSR-BASELINE (kohm)	207.886		197.286	
GSR-COLD (kohm)	217.171		206.143	
GSR-RECOVERY (kohm)	210.771		200.229	
Gen. Mean	211.943	***	201.219	***
C.V.	0.963		0.815	
F Prob.	0.000		0.000	
S.E.M.	0.345		0.277	
C.D. 5%	0.973		0.782	
C.D. 1%	1.292		1.039	

TABLE :2 – GSR-SUMMARY

Variable	MALE		Std. Err.	Std. Dev.	FEMALE		Std. Err.	Std. Dev.	T Test	Prob-ability		Mann Whitney	Proba-bility	
AGE in yrs	19.543	±	0.150	0.886	19.343	±	0.123	0.725	1.033	0.305		541.000	0.198	
GSR BASELINE(kohm)	207.886	±	1.683	9.958	197.286	±	1.356	8.024	4.904	0.000	***	252.000	0.000	***
GSR-COLD (kohm)	217.171	±	1.477	8.736	206.143	±	1.242	7.345	5.716	0.000	***	198.000	0.000	***
GSR- RECOVERY (kohm)	210.771	±	1.622	9.595	200.229	±	1.367	8.084	4.971	0.000	***	225.000	0.000	***

TABLE:3-Anova(Summary)

		GSR (kohm) Male		GSR (kohm) Female	
Replicates	34.00	259.23	***	178.31	***
Time	2.00	790.49	***	712.18	***
Error (A)	68.00	4.16		2.69	
Total	104.00	102.67		73.75	
General Mean	-9.00	211.94		201.22	
C.V.	-9.00	0.96		0.81	
C.D. 95%	-9.00				
Ai.- Aj.(Time)	-9.00	0.97		0.78	

The data of Galvanic Skin Response obtained were exported to Microsoft excel and then to WINDOWSTAT software for further analysis.Results were analysed statistically using ANOVA & t- test.

In males mean baseline value of GSR was 207.8 ± 9.95 kohm.After cold stimulation GSR value increased significantly to a mean value of 217.17 ± 8.73kohm ($p < 0.05$).GSR returned to near baseline value of 210.77 ± 9.59kohm after cessation of cold stimulation.

In females the mean baseline value of GSR was 197.28 ± 8.024 kohm. After cold stimulation GSR value increased significantly to 206.14 ± 7.34kohm ($p<0.05$). After cessation of cold stimulation mean value of GSR returned to near baseline value of 200.22 ± 8.084 kohm.

DISCUSSION

The objective of our study was to evaluate the changes in skin conductance due to autonomic changes during pain induced by cold pressor test&to observe the differences among males and females.

In the present study the GSR value was significantly increased in both males and females after pain induced by Cold Pressor test.The baseline GSR value,GSR after cold stimulation&GSR after cessation of cold stimulation were significantly higher in males compared to females. Similar result was obtained by many studies[9,23,24,25,26,27]

Electrodermal activity (GSR) includes both tonic and phasic components.

Tonic component includes skin conductace level(SCL),a baseline measure that changes slowly with altered arousal state and nonspecific fluctuations consisting of spontaneous responses that arise in the absence of apparent stimulation.Phasic responses are stimulus elicited and typically quantified by measuring the change in conductance that occurs in response to a discrete stimulus[28]

Galvanic skin response is a result of polysynaptic reflex activation .The efferent part of the reflex consists of myelinated sympathetic fibres that originates from intermediolateral horn of segments (T1-L2) of spinal cord and terminates on paravertebral ganglia.Post ganglionic fibres are nonmyelinated and innervates the eccrine sweat glands,the central part of reflex arc is not fully understood yet.It is presumably polysynaptic with a connection to a structure of hypothalamus VL part

of brainstem,medial & basal part of the frontal lobe& medial part of temporal lobe.The afferent tract of the reflex arch depends on stimulus modality[29]

Human sweat glands receive signals primarily from sympathetic cholinergic fibres that use the neurotransmitter, Ach.Thus the pain induced by cold pressor stimulates sympathetic nerves which increases sweat production that decreases the resistance and increases conductance before the sweat is reabsorbed[30]

Data from literature indicates that skin sympathetic response recorded from palm of the hand and sole of the foot is a method that can reliably be used to describe a small section of the autonomic nervous system (sympathetic sudomotor function) and to calculate group differences[31]

Changes in skin conductance may be a promising tool for monitoring pain.One of the studies have shown that unlike heart rate&blood pressure,which are influenced by both sympathetic&parasympathetic nervous systems. Skin conductance is only influenced by the sympathetic nervous system[32]

A particular study evaluated pain response in preterm infants by analysing skin conductance fluctuations.The pain stimuli induced an immediate increase in emotional sweating & skin conductance fluctuations& when the pain stimuli are terminated the fluctuations decreased immediately[33]

As pain greatly modifies surgical stress response[34]monitoring of parameters of postoperative stress such as sympathetic tone could be helpful tool for assessment of analgesia.Increased sympathetic tone leads to a higher rate of firing in sympathetic postganglionic cholinergic neurons[33,35]

Responses to direct cooling may result from a number of mechanisms including direct effects on cutaneous venous α-AR[36]

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

Differences in autonomic system may be due to differences in afferent receptor stimulation in central reflex transmission in the efferent nervous system, in post synaptic signalling.There may be

effects due to different size or number of neurons, variations in receptors,differences in neurotransmitter content,metabolism as well as functional differences in various components of reflex arc[37].

A study in which sympatho adrenergically mediated vasoconstriction was evaluated.forearm vasoconstrictor responses to intraarterial noradrenaline were also significantly less in women than in men[38].Oestrogen has been shown to modulate neuronal activity both in a receptor dependent & independent manner[39]

These observations prompted to propose the novel hypothesis that oestrogen acts within central autonomic nuclei to regulate autonomic tone.The principal central nuclei involved include the insular cortex, lateral hypothalamic area,central nucleus of amygdala, parabrachial nucleus,NTS,NA, RVLM[40]

It has been shown that sex hormones affect multiple aspects of central neuronal function oestrogen increased the density and affinity of muscarinic receptors.

CONCLUSION

There is substantial evidence of gender difference in functioning of autonomic system , including specific effects of both male& female sex hormones. As a generalisation ,at least in humans there is a preponderance of sympathetic mediated responses in males and of parasympathetic in females.

Our data show that EDA(gsr) is such a simple and non invasive method that can be used reliably to measure the autonomic nervous system functions i.e.,the sympathetic over activity during cold induced acute pain.

Ethical Clearance: Taken from Institutional Ethical committee.

Source of Funding : NIL (Institutional)

Conflicts of Interest : NIL

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Thyroid Hormone Levels in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Introduction: Diabetes mellitus (DM) is one of the important health problems affecting the major populations worldwide. Diabetes mellitus, endocrine disorder which involves multiple organ systems and leads to significant morbidity and mortality due to accompanying complications.Thyroid diseases and diabetes mellitus are common endocrine disorders. The present study is carried out for the assessment of thyroid dysfunction in type 2 diabetic patients by measurement of serum T3, serum T4 and serum TSH levels.

Materials & method: This study was conducted in Department of Physiology in association with Department of Endocrinology, JNU Institute for Medical Sciences & Research Center, Jaipur. A total of 100 subjected were enrolled into the study. They were divided into 2 groups, 50 age and sex matched healthy subjects were taken as group I (controls) (HbA1c: 5.5 to 6.5 %) and 50 type 2 diabetes mellitus subjects were taken as group II (HbA1c: >7.5 %). Age of the study subjects was 35 to 65 years. Under aseptic conditions, 5 mL random venous blood sample is collected from all subjects in vacutainers, 2 mL in plain tube and 3 mL in EDTA tube.Serum sample was used for the estimation of random sugar (GOD-POD method) by using ERBA chemistry analyzer, thyroid profile by ELISA method, using mini VIDAS and EDTA sample is used for estimation of HbA1c by using BIORAD-D10. Data were expressed as mean ±SD. P value <0.05 is considered as statistically significant.

Results: Random blood sugar and HbA1c levels were significantly increased in T2DM (group II) subjects compared with controls (group I). T3 levels were significantly decreased and TSH levels were significantly increased in T2DM subjects compared to controls. HbA1c is positively correlated with TSH.

Conclusion: In this present study, we have observed that the abnormal thyroid hormone levelsamong type 2 diabetics. Therefore there is a need for the routine assay ofthyroid hormones in type 2 diabetes mellitus inorder to improve the quality of life and reduce the morbidity.

Keywords: Diabetes mellitus, Hypothyroidism, Glycated hemoglobin

INTRODUCTION

Diabetes mellitus (DM) is one of the important health problems affecting the major population worldwide[1].

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Diabetes mellitus, endocrine disorder which involves multiple organ systems and leads to significant morbidity and mortality due to accompanying complications[2]. Diabetes mellitus is characterized by absolute or relative deficiency in insulin secretion or insulin action or both, associated with hyperglycemia, and disturbances in carbohydrate, lipid and protein metabolism.Thyroid diseases and diabetes mellitus are common endocrine disorders[3]. Diabetic patients have increased prevalence of thyroid disorder, with hypothyroid being the most

common[4]. In diabetic patients, thyroid dysfunction varies from 2.2% -17%. Diabetic women are more commonly affected than men [5]. Hypothyroidism is a clinical syndrome occurs from a deficiency of thyroid hormones. It is very common thyroid problem in diabetic patients[6].

Thyroid hormones and insulin are the antagonists, and involved in metabolism of carbohydrates, proteins, and lipids. The functional impairment occurs in thyroid hormone as well as insulin if their levels are altered[7]. Thyroid disorders adversely affect diabetic control. DM appears to influence thyroid function in two sites; firstly at the level of hypothalamic control of TSH release and secondly at the conversion of T4 to T3 in the peripheral tissue. Increased hyperglycemia causes reversible reduction of the activity and hepatic concentration of T4-5´-deiodinase, low serum T3, increase in reverse T3 and also variation in the level of T4 [8]. Failure to identify theimbalance of thyroid hormones in patients with type 2 diabetes may be a major cause of poor management and diagnosis of diabetic patients[6].Therefore, there is need to consider the thyroid hormones in type 2 diabetic patients as routine investigations and serumT3, T4 and TSH are more reliable and sensitive tests for thyroid dysfunction in the management of type 2 diabetic patients. Therefore, the present study is carried out for the assessment of thyroid dysfunction in type 2 diabetic patients by measurement of serum T3, serum T4 and serum TSH levels.

MATERIALS & METHOD

This is a prospective, case-control study, conducted in Department of Physiology in association with Department of Endocrinology, JNU Institute for Medical Sciences & Research Center, Jaipur. After obtaining permission from Institutional Ethical Committee and written informed consent from study participants, a total of 100 subjected were enrolled into the study. They were divided into 2 groups, 50 age and sex matched healthy subjects were taken as group I (controls) (HbA1c: 5.5 to 6.5 %) and 50 type 2 diabetes mellitus subjects were taken as group II (HbA1c: >7.5 %). Age of the study subjects was 35 to 65 years. Patients with a history of hypertension, renal impairment, autoimmune disorders, carebrovascular diseases, acute respiratory failure, previous vascular events (angina, myocardial infarction and acute arterial occlusion) were excluded from the study. A detailed clinical and physical examination was done for all study participants. Under aseptic conditions, 5 mL random venous blood sample is collected from all subjects in vacutainers, 2 mL in plain tube and 3 mL in EDTA tube.The blood samples were centrifuged at 2500 rpm for 10minutes to obtain serum. The separated serum sample was used for the estimation of random sugar (GOD-POD method) by using ERBA chemistry analyzer, thyroid profile (serum T3, T4 and TSH) by ELISA method, using mini VIDAS and EDTA sample is used for estimation of HbA1c by using BIORAD-D10.

Statistical Analysis:

Data were expressed as mean ±SD. P value <0.05 is considered as statistically significant. Pearson's correlation coefficient for correlation of TSH and HbA1c.Statistical analysis was done by using SPSS 20.0, Stata 8.0.

RESULTS

Random blood sugar and HbA1c levels were significantly increased in T2DM (group II) subjects compared with controls (group I). T3 levels were significantly decreased and TSH levels were significantly increased in T2DM subjects compared to controls (Table 1). HbA1c is positively correlated with TSH (Table 2). T4 levels were not significant.

Table 1: Comparison of study parameters between T2DM cases and controls

Parameters	Controls (n=50) Mean±SD	T2DM (n=50) Mean±SD	p Value
Random Blood sugar (mg/dL)	94.02±10.121	169.10±46.658	<0.001*
Glycated Hemoglobin (%)	5.4±0.29	7.31±1.67	<0.001*
Total T3 (ng/mL)	3.04±1.04	1.50±0.46	<0.001*
Total T4 (mg/dL)	6.49±3.35	6.37±1.91	0.824
TSH (mIU/mL)	1.06±0.38	3.80±1.14	<0.001*

* Statistically significant

Table 2: Spearman's rho correlation between HbA1c and TSH

Parameter	Correlation Coefficient(r)
HbA1c	0.468**

**Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The present study is carried out for the assessment of thyroid dysfunction in type 2 diabetic patients. The thyroid hormones, total T3, total T4 are insulin antagonists. These hormones potentiate the insulin action indirectly TRH synthesis decreases in diabetes. These could be responsible for the occurrences of low thyroid hormone levels in some diabetics[9, 10].

The study showed that the serum total T3 levels decreased and serum TSH levels were increased in type 2 diabetics when compared to controls. A study by Singh G et al., reported that type 2 diabetes mellitus patients had abnormal thyroid hormone levels. The level of T3, T4, FT3 and FT4 were significantly lower while the levels of TSH were significantly higher in type 2 diabetics as compared to non-diabetics, which agrees with the findings of this study[11].

Diabetes Mellitus and hypothyroidism, both are closely related endocrine disorders, and are associated with several metabolic abnormalities. The effect of thyroid hormones, T4 and T3, on body homeostatic energy and metabolic regulation is explained by its action on peripheral tissues. Secretion of insulin is influenced by thyroid hormones. Hypothyroidism causes decrease in glucose-related β-cell insulin secretion. Gene array studies in hypothyroid patient's skeletal muscle have shown a classical effect on sugar transporter expression by down-regulating the GLUT5 in hypothyroidism. On the contrary, expression of GLUT4 is not changed, but model animals showed altered translocation of GLUT4 to the cell membrane and negative alteration of enzyme-baseddegradation of intracellular sugar in hypothyroid state [12]. In diabetes mellitus there is influence of endocrine and non-endocrine organs other than pancreas and there are alterations in the hypothalamus-pituitary-thyroid axis. Hypothalamic and plasmaTRH, pituitary and plasma TSH, as well as TSH secretion ratesare reduced, and the TSH response to TRH is decreased. Despitenormal peripheral TSH metabolism T3 and

T4 production andiodide uptake by the thyroid are diminished. There are importantstructural changes in the thyroid gland and pituitary that areaccompanied by marked alterations in their secretary activities. In the peripheral tissues, T4deiodination to T3 is decreased. Iodothyroninesare insulin antagonist with high levels being diabetogenic, whileabsence of the hormone inhibits the development of diabetes.These situations may prevail in diabetics and would be aggravatedin poorly controlled diabetics. Oxidative stress, which is associated withdiabetes, may also cause changes in the hypothalamus anteriorpituitaryaxis in diabetics [13-14].

In the present study, we found deceased T3 levels with significantlyincreased random blood glucose and HbA1c in type 2 diabetics. The level of TSH was significantly elevated in type 2 diabetics. The interaction between thyroid disorders and diabetes mellitus is a complex process. Low T3 state is described as low serum total and free T3 levels but near normal serum T4 and TSH concentrations [15]. Low serum T3 is due to reduced peripheral conversion of T4 to T3 [16]. It is well known that insulin, an anabolic hormone enhances the levels of FT4 while it suppresses the levels of T3 by inhibiting hepatic conversion of T4 to T3 [17].TRH synthesis decreases in diabetes mellitus and also there is loss of nocturnal TSH peak which is responsible for the occurrences of low thyroid hormone levels in some diabetics.

In the present study HbA1c wasfound to be significantly increased in patients with diabetes,and it was directly proportional to the bloodglucose levels. According to Kim et al,[18]hypothyroidismfalsely increases the HbA1c levels due to reduced erythropoiesis.Thyroid hormone replacement is associated with a decreasein HbA1c level, which is influenced by increased erythropoiesisrather than by changes in glucose level[19,20]. It has recently been reported that T3has an anti-apoptotic and protective effect on the pancreaticβ-cells [21]. T3 activates the PI-3 kinase pathway viathyroid hormone receptor on the β-cell, and stimulatesinsulin secretion. This may be related to an associationbetween increased FT3 levels and decreased HbA1c i.e. lowtotal T3 [22]. Our result of a positive correlation between HbA1c andTSH is consistent with the results by Velija-Asimi et al., [23]. They examined the effects of treatment of subclinicalhypothyroidism on metabolic control and hyperinsulinaemia and concluded that the correlation between TSH andHbA1c were positive and significant. Studies have reported that, there is increased prevalence

of thyroid dysfunction in diabetes mellitus patients, it is necessary to identify the people with greater risk like patients over 50 or 55 years of age, especially in clinically suspected patients or lipid abnormalities. So it is necessary to suggest that a testing of thyroid profile will help to analyze the development ofhypothyroidismin patients with type 2 diabetes mellitus[12].

CONCLUSION

In this present study, we have observed that the abnormal thyroid hormone levelsamong type 2 diabetics. Failure to early identification of abnormalthyroid function may be a primary cause of poor management ofdiabetes mellitus. Therefore, there is a need for the routine assay ofthyroid hormones in type 2 diabetics inorder to improve the quality of life and reduce the morbidity. The study on a larger population willhelp to give further information about the relationship between theglycatedhemoglobin and thyroid functions.

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Effect of Obesity on Electrocardiographic Parameters in Children : A Comparative Study

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ABSTRACT

Background: Obesity is becoming a global epidemic in both adults and children and is the leading preventable cause of death worldwide due to cardiovascular disease. Obesity is closely associated with wide variety of Electrocardiographic (ECG) abnormalities including ischemic ECG observations.

Objectives: Present study was designed to assess the ECG changes in obese asymptomatic male childrens and to compare with that of normal male children group.

Materials and method: Study was done in 50 apparently healthy obese male children between the age group of 5-18 years and 100 normal male children of the same age group .. A 12 lead ECG was recorded using computerized ECG machine and analysed for Heart rate, PR interval, QTc interval, QRS axis. Results were compared by Student's unpaired *t* test and analysed.

Results : Results in this study showed ECG variations which include significant increase in heart rate, prolongation of QTc interval and leftward shift of QRS axis in obese children group compared to non obese children. There was significant increase in PR interval in obese children compared to non obese group. However all the changes in ECG observed were within normal limits.

Conclusion: Variety of ECG changes occur even in asymptomatic obese children and obesity increases the risk for cardiovascular diseases, these ECG changes with respect to the baseline values should be known as early as possible so that early interventional measures could be taken to decrease the future risk of cardiovascular diseases.

Keywords : *ECG ; Obesity; QT_C interval.*

INTRODUCTION

The prevalence of overweight and obesity in children is a growing global health concern according to the World Health Organization. [1] It is well established that obesity is a strong risk factor for cardiovascular morbidity and mortality.[2]

Obesity is defined as a state of increased body weight, due to adipose tissue accumulation that is of sufficient magnitude to produce adverse health effects. There are two types of obesity, diffuse and central or visceral. Visceral fat is more metabolically active than subcutaneous fat, hence is associated with a much higher risk for several diseases.[3]

Obesity is associated with a heterogeneity of metabolic abnormalities (*e.g.*, dyslipidemia, low HDL levels,insulin resistance, hyperglycaemia, hypertension, pro-inflammatory state)[4] where each of them predispose patients to numerous cardiac complications like coronary heart disease, heart failure, stroke and even sudden death.[5,6]

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Bad lifestyle habits started in childhood have been proved to persist through adulthood, favouring the development of cardiovascular risk factors. [7]

Etiology of obesity is multi-factorial which includes genetic, environmental and psychological factors. Changing diet (high fat energy diet) and decreasing physical activity (sedentary life style) are believed to be the two most important causes for childhood obesity. [8]

Body Mass Index (BMI), Waist Circumference(WC) and Height Weight Ratio(HWtR) are measures of obesity and are efficient risk factor predictors of CVD in children. BMI is a measure of relative size based on the mass and height of an individual. [6,9]

Obesity has potential to affect Electrocardiogram, most of which reflect alterations in cardiac morphology. Obesity is closely associated with wide variety of Electrocardiographic (ECG) abnormalities including ischemic ECG observations which often lead to cardiovascular events. [10]

Furthermore, there is currently little evidence of an association between obesity and ECG variables in children.

ECG recording is a simple and non-invasive technique. Hence this study is taken up to detect the Electrocardiographic changes in asymptomatic obese children and to study prevalence of such abnormal ECG findings and predict the possibility of future cardiovascular diseases as early as possible, so that corrective measures at a very early stage are more likely to be beneficial.

MATERIALS AND METHOD

The study was undertaken in 50 apparently healthy obese male children between age group of 5-18 years and 100 normal male children of same age group who were selected randomly from schools in and around Davangere.

The study protocol and the procedures were approved by the institutional Ethics Committee (IEC) and Institutional Ethics Committee (IEC) clearance was obtained before beginning the study. We approached schools in and around Davangere and nature and purpose of the study was explained. A written fully informed consent was obtained from parents or legal guardians of all subjects.

Subjects participating in this study were screened for the presence of inclusion and exclusion criteria and dropped, if any exclusion criteria were present such as children above 18 years and below 5 years of age, chronic renal diseases, thyroid diseases, severe anemia, electrolyte imbalance, history of previous surgery and medications, history of chronic illness like diabetes mellitus, hypertension, tuberculosis etc., and other conditions that are likely to influence the study are excluded.

A detailed physical and systemic examination of individual subjects was done in the morning using a pre-structured Proforma. Resting pulse rate is recorded from the Radial artery and blood pressure is recorded using a mercury sphygmomanometer with the appropriate sized cuff in seated position.

Anthropometric measurements like body height in centimeters, weight in kilograms were measured by using the standard protocols while the participants are barefoot and in light clothes. Waist circumference was measured with a horizontally placed non-elastic flexible tape in the middle of the distance between the lowest rib and the iliac crest following normal expiration.

BMI for a person is calculated as their body mass divided by the square of their height i.e Weight (kg)/height^2 (m²). Overweight and obesity were defined by the recommended standard BMI cut off values by the International Obesity Task Force, according to age and gender. BMI within range 25-29.9 kg/m^2 is considered as overweight. And BMI more than 30 kg/m^2 is obesity. [11]

A Standard 12 lead ECG were recorded during the resting state in supine position using computerized NIVIQURE Digital ECG machine and data stored in a personal computer for subsequent processing. Special emphasis was given on heart rate(beats per minute), PR interval(in seconds), QT interval(in seconds), QTc interval(in seconds), QRS axis change (in degrees) and all parameters were analyzed.

Standard ECG reference values will be taken from Wagner G .S: Interpretation of normal electrocardiogram. [12]

Plan of Analysis and Statistical Tools:

Continuous variables were expressed as mean ± standard deviation (SD) and Categorical data as frequencies and percentages. Differences between groups

was compared using two-tailed unpaired student's t-test. Comparisons of categorized variables between groups was performed using the χ^2 test. Pearson's correlation coefficients were used to explore correlation between ECG variables and obesity-associated measurements, including BMI, WC and WHtR. The linear associations between variables were further examined using multivariate linear regression analysis. All tests of statistical significance were two-sided and P < 0.05 was considered to indicate a statistically significant difference, P<0.001 as : HS-Highly significant and P>0.05 as : NS-Not Significant. The statistical analyses was conducted with SPSS 20.0.

RESULTS

The results obtained were expressed as mean ± standard deviation. The study showed the following results.

Table 1: Comparison of incidence of occurrence of abnormal Heart rate (bpm) in obese and controls

Heart Rate (bpm)	Groups				Chi Square Test
	Obese		Control		
	Frequency	Percent	Frequency	Percent	
Normal	43	86	96	96	
Abnormal	7	14	4	4	4.91, P<0.03
Total	50	100	100	100	

Table 2: Comparison of incidence of occurrence of abnormal PR interval (seconds) in obese and controls

PR interval (sec)	Groups				Fisher's Exact Test
	Obese		Control		
	Frequency	Percent	Frequency	Percent	
Normal	42	84	100	100	
Abnormal	8	16	0	0	P<0.000
Total	50	100	100	100	

Table 3: Comparison of incidence of occurrence of abnormal QTc interval (seconds) in obese and controls

QTc interval (sec)	Groups				Chi Square Test
	Obese		Control		
	Frequency	Percent	Frequency	Percent	
Normal	28	56	77	77	
Abnormal	22	44	23	23	7.00, P<0.008
Total	50	100	100	100	

Table 4: Comparison of incidence of occurrence of abnormal QRS axis (degrees) in obese and controls

QRS axis (degrees)	Groups				Fisher's Exact Test
	Obese		Control		
	Frequency	Percent	Frequency	Percent	
Normal	47	94	100	100	
Abnormal	3	6	0		P<0.03
Total	50	100	100	100	

Table 5: Comparison of Heart rate (bpm), PR interval (sec), QT$_C$ interval (sec), QRS axis (degrees) between obese group and controls

Groups		N	Mean	Std. Deviation	t Value	P Value	Significance
Heart rate (bpm)	Obese	50	87.80	9.53	1.98	P<0.05	Significant
	Control	100	84.06	11.55			
PR interval (sec)	Obese	50	0.15	0.04	5.23	P<0.000	Highly significant
	Control	100	0.12	0.02			
QT$_C$ interval (sec)	Obese	50	0.44	0.04	3.64	P<0.000	Highly significant
	Control	100	0.41	0.06			
QRS axis (degrees)	Obese	50	54.68	25.76	2.06	P< 0.04	Significant
	Control	100	51.43	21.87			

DISCUSSION

The obese and non-obese children were comparable with respect to age, sex, height. Obese subjects, however, had significantly higher BMI, higher body surface area.[6,9]

We observed obesity in children is closely associated with wide variety of ECG changes.

In our study HR were significantly higher in obese children compared to controls. This increase in HR could be supported by the fact that obesity is associated with change in autonomic activity, which includes significant reduction in parasympathetic activity and significant increase in sympathetic activity.[13] Autonomic Nervous System is associated with the regulation of Energy and Body fat content. Increased sympathetic activity in overweight and obesity may be a compensatory mechanism to burn fat and minimize further accumulation of fat and weight gain, but at the cost of increased sympathetic discharge to heart, kidneys and peripheral vasculature.[14]

This result is consistent with other studies.

Guo-Zhe Sun and his colleagues in their study 'association between obesity and ECG variables in children' observed that higher heart rate existed in obese group when compared to normal weight subjects.[6]

Narumi Nagai and his co-workers observed that obese children group had significantly higher resting heart rate compared with the non-obese group.[14]

Stuart Frank and his colleagues in their study found increase in heart rate with increasing obesity.[15]

Significant increase in PR interval was noticed in obese children compared to controls.

Observing the QTc interval in this study, there was prolongation of QTc interval in obese children which is highly significant compared to controls. This is explained on the fact that increase in QTc is due to cardiac autonomic neuropathy in obesity which may result in sympathetic imbalance and QTc interval prolongation.[10]

Furthermore, studies have suggested that an elevated cardiac output in obesity, due to an increased stroke volume and overall greater body mass, may contribute to altered autonomic nervous system balance which could have increased QTc interval in this study.[16]

In addition, it could also be also suggested that diabetes mellitus, hyperinsulinemia and insulin resistance due to obesity may induce cardiovascular disease and may play a role in prolonged QTc interval.[17]

Length of QT interval represents the time interval between the start of the ventricular depolarisation and the completion of its repolarization; prolongation of

this interval means delayed repolarization of ventricular myocardium and is considered a precursor of malignant arrhythmias and sudden death.[18]

Guo-Zhe Sun and his colleagues in their study observed prolongation of QTc interval in obese group when compared to normal weight children.[6]

El-Gamal et al reported in their study that prolongation of QTc interval was significantly associated with relative body mass and fatness.[16]

Theodora W and his colleagues showed that subjects with high waist circumference were associated with longer corrected QT interval.[19]

QRS axis serves as a sign for left ventricular hypertrophy and bundle branch block.[20]

In our study significant leftward deviation of the QRS axis was observed in obese children as compared to controls. Although this deviation was statistically significant, probably is not clinically important. But these changes above the baseline values must be considered when evaluating electrocardiographic changes in pathological condition in obese subjects.

There occurs significant increase in stroke volume, cardiac output in obese children, indicating increased cardiac workload [21] leading to an increase in cardiac mass that is proportional to degree of obesity which is an explanation for the progressive shift of the mean QRS vector toward the left or it could be due to change in the anatomic position of the heart in the thorax which is due to the fact that heart is displaced in obesity because of the rise of diaphragm, which may be due to excessive fat accumulation[15] and also may be due to the increased distance between the heart and the recording electrodes which is due to the fat accumulation.[15]

This result is consistent with other studies.

Stuart Frank et al in their study noticed leftward shift of frontal QRS axis in obese group and the mean frontal plane QRS axis (QRS vector) tended to shift to the left as percentage of overweight increased.[15]

Guo-Zhe Sun and his colleagues observed results indicating that in children and adolescents, general and abdominal obesity is associated a leftward shift of frontal QRS axis.[6]

Fraley MA et al observed leftward shifts in electrocardiographic axes as markers of left ventricular hypertrophy in obese individuals.[22]

CONCLUSION

Obesity is associated with wide variety of electrocardiographic (ECG) abnormalities. Furthermore, most of these reflect alterations in cardiac morphology. Some serve as markers of risk for sudden death. Many of these ECG abnormalities are reversible with substantial weight loss, finding the cause of obesity and preventing obesity in early years is currently a critical issue in the Pediatric public health research field.

Conflict of Interest: None to declare.

Institutional Ethical committee clearance: Obtained.

Source of support : None Declared

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Comparison of VO$_2$ Max in Untrained Healthy Adults-Bicycle Ergometer and Harvard Step Test

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ABSTRACT

The purpose of the study was to compare the VO$_2$ max from bicycle ergometer and Harvard step test in untrained adults. A total of fifty students between age group of 18-25 yrs were enrolled for the study (25 were males and 25 were females) all the participants were randomly selected and divided into two groups group A and group B. After analysing by student t- test significant differences in physiological responses between the two tests were seen between bicycle ergometer test and Harvard step test. So, it can be explained by the fact that except different levels of load and intensity of work and types of movements or movement characteristic for certain ergometer, there can be different cardio respiratory and metabolic reactions

Keywords: *VO$_2$, VO$_2$max, Harvard step test, Bicycle ergometer.*

INTRODUCTION

In recent years, physical exercise has gained prime importance in public life for its enormous health benefits. Cardiovascular and metabolic diseases have become common in individuals leading a sedentary life .Practice of regular physical exercise not only prevents the occurrence of such diseases but decrease their intensity also cure from the diseases. Exercise improves the physical fitness[1]. VO$_2$ max is the maximum amount of oxygen our body can use during exercise, expressed in millilitres per kilogram per minute (ml/kg/min)[5] Maximal oxygen uptake (VO$_2$ max) considered to be the best indicator of the aerobic power expressing the ability of the cardio respiratory system to transport oxygen to active tissues.[6] As we begin exercise, our muscles start working above our rest VO$_2$max rate. As a result they naturally need more fuel because increased demand requires more oxygen so our breathing gets progressively faster and deeper as our exercise pace increases. The introduction of continuous exercise testing led to the development and validation of numerous protocols for testing VO2max[8] Bicycle ergometer exercise and Harvard step test exercise will save the time. Apart from regular exercise these methods are also used in the performance of multistage sub-maximal or maximal stress testing [4] . Furthermore, at that time, the researchers were focused on the suitability of a given protocol to match a subjects fitness and health status, the

incidence of a VO$_2$ plateau at VO$_2$max, and the use of sub maximal VO$_2$ data to predict VO$_2$max. This study is designed to compare two direct methods Harvard step test and bicycle ergometer for the estimation of maximal oxygen uptake in apparently healthy young adults**.** The Harvard step test is a test of aerobic fitness, developed by Brouha et al.(1943) in the Harvard Fatigue Laboratories. The features of this test are that it is simple to conduct and requires minimal equipment [9]. Before the subject start the ergometer test, they typically perform a low-resistance warm-up for at least two minutes to help minimize the risk of injury [10].

MATERIALS AND METHOD

In the present study, all the students 18-25yrs age were included as study participants. The study was approved by Institute's Research council and Ethics committee. After determining the eligibility as per selection criteria, the volunteers were invited to participate and briefed about the nature of the study and written informed consent was obtained from them. A pre-designed questionnaire was used to record the information about descriptive data of the patients age, detailed family history and personal history, including history of smoking , alcohol consumption and history of long term drug intake which would affect the health and detailed history consisting of family history of hypertension and cardiovascular illness by interviewing

the participant.

Subjects were divided into two groups randomly by Group A and Group B. There were 25 subjects in group-A(Males) and 25 subjects in group-B(females). Tests were performed for each subject in two days. One subject from Group A performed Harvard step test exercise and One subject from Group B performed bicycle ergometer exercise on the first day, On next day subject of the exercising group were interchange i.e.- Group A subject performed bicycle ergometer exercise and Group B subject, performed Harvard step test. These protocol were followed for all subjects.

Cardiovascular parameter like blood pressure was recorded by using mercury sphygmomanometer and pulse rate will be counted. BP and PR were recorded at resting state and immediately after the exercise [1] for both tests.

Harvard step test- Equipment required: Step or platform of 40cm high

The subject performed step up and down on the platform at a rate of 30 steps per minute (every two seconds) for 5 minutes or until exhaustion. The subject was immediately sit down on completion of the test, and the pulse rate was determined (no. of pulse was noted for 15 sec and count was multiplied by 4).

Bicycle Ergometer- The bicycle ergometer was properly checked, clearly told and calibrated before the procedure. Upon completion of the warm-up the subject had rest for one minute. The subject was get a five second countdown to begin the test, subject was continue to pedal quickly for 5 minutes or until exhaustion. We need to count and record the number of revolutions pedaled for every five second interval during the test, through which study data can be determined. Upon completion of the test immediately, number of pulse rate was counted (no. of pulse was noted for 15sec count was multiplied by4).

The final Recording of systolic and diastolic blood pressure was made just after recording of pulse rate for both tests.

CALCULATION OF VO_2 MAX-

In Males:

VO2max (ml/kg/min) = 111.23-(0.42 x pulse rate in beats/min)

In Females:

VO2max (ml/kg/min) = 65.81-(0.184 x pulse rate in beats/min)

DATA ANALYSIS-

The data for all the parameters analyses was expressed as Mean ± S.D.

Student's t-test was used to compare the data between Bicycle ergometer and Harvard step test. Difference were considered significant at p<0.05 level.

Results: A cross sectional study was conducted to find out the effect on vo_2 max by comparison between Bicycle Ergometer exercise and Step Bench exercise in Healthy young adults. The Data was analyzed for 50 volunteer students.

Age ,body height ,body weight and BMI of both groups were presented in table -1and similarity is found in age and BMI but height and weight of males were high.

Group -1 Mean±SD of Vo2max(ml/kg/min.) of with both tests were presented in table -2 out of with bicycle ergometer were shown high Vo2max (58.64,±7.35) with maximum of 76.89 and minimum of 45.81 with Harvard step test (48.36,±7.61) max 68.49 and min of 35.73. Level of significance is P-value 0.001*.

Group -2 Mean±SD of Vo2max(ml/kg/min.) of with both tests were presented in table -2 out of with bicycle ergometer were shown high Vo2max (43.64, ±2.62) with maximum of 48.82and minimum of 39.95with Harvard step test (40.65, ±3.23) max 47.34and min of 34.04. Level of significance is P-value 0.000*.

TABLE1- Baseline characteristics-Age, Height, Weight, BMI of Group A(Males) and Group B(Females).

Basal Parameters	Group A (Males) Mean±SD	Group B (Females) Mean ±SD
Age(Years)	18.76 ±1.16	18.60 ±0.81
Height(cm)	1.69±0.79	1.56 ±0.058
Weight(kg)	60.80±8.73	52.64 ±6.44
BMI(kg/m²)	21.19 ±1.92	21.49 ±2.53

TABLE -2.   Comparison of VO$_2$max by after bicycle ergometer and Step Bench Exercise in Group B(Females)and Group A(Males)

Parameters	After Exercise (Bicycle ergometer)			After Exercise (Step Bench)			P-value
	Mean , ±SD	Max.	Min.	Mean , ±SD	Max.	Min.	
Vo2max (ml/kg/min.) Females	43.64, ±2.62	48.82	39.95	40.65, ±3.23	47.34	34.04	0.000*
Vo2max (ml/kg/min.) Males	58.64,±7.35	76.89	45.81	48.36,±7.61	68.49	35.73	0.001*

Discussion: Increase in VO2 max with training results primarily from an increase in maximum cardiac output. VO2 max is an important variable which sets the upper limit for endurance performance. It was seen that the body weight has a significant influence on the test reliability, while the influence of body height was at a minimal level [1]. The participants had a higher O2 consumption rate and energy expenditure on the Bicycle ergometer test, when compared to step test. This is clearly depicted in table-2. The difference can be explained by the fact that the physiological reaction of the body in step test is different in comparison to work on a bicycle ergometer. Post exercise heart-rate is the primary parameter for estimating aerobic capacity[3]. Relationship between the performance of tests and VO2max were Recovery Test or Endurance Test[2]. From present study, the finding showed a significant positive relationship between the performance of the tests and the VO2max during the Maximum Incremental Bicycle Running Test ($p < 0.05$,n = 50). The mean and standard deviation of the respiratory ratio of the participants in the Maximum Incremental Bicycle Running Test was (128.48,±4.97, 74.40, ±7.72, 125.44,±17.51 ,119.04, ±8.92, 72.48, ±8.41, 120.00, ±14.21). This ensured that all participants achieved a maximum effort in the Maximum Incremental Bicycle Running Test. Deviations in the predicted values of maximal oxygen consumption in this study can be explained physiological responses to work in the step test determine their characteristics in relation to work during riding on bicycle ergometer. VO$_2$ max will result in strengthening the muscle of heart and increasing blood inflow to tissues, strengthening blood circulation system, regulating blood pressure, decrease of heart activity while resting and improving the condition of blood vessels [7] Work on the step bench in relation to the bicycle ergometer is different because of the engaged muscles and their mass, and the reaction of the cardiovascular system. From a physiological point of view it is not justifiable to expect that different types of work, even when they have the same values, will give the same physiological response of an organism. In the end it is necessary to indicate that for the precise evaluation of the objectivity of these two sub-maximal tests which were presented in this work it was necessary to compare them with the data about maximal oxygen consumption measured in the laboratory.

CONCLUSION

Significant differences in physiological responses between the two tests were seen. The present study clearly demonstrates that aerobic Bicycle ergometer is more suitable to improve cardio-respiratory fitness and in prescribing weight loss exercises. Step aerobics is practiced in health centers, fitness training gyms and academic institutions all over the world because of its simplicity. It means that by the application of these tests, we can get objective information about the aerobic abilities of the participants.

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