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Indomethacin-induced Exacerbation of ARDS in Rats not involving Vagally Mediated Mechanisms

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ABSTRACT

Background: Acute respiratory distress syndrome (ARDS) is a fatal disease associated with hypoxemia and lung injury. Recently it was shown that indomethacin exacerbated oleic acid (OA)-induced ARDS. Neurally mediated mechanisms were speculated in the exacerbation. Vagus supply the pulmonary tissue and possess protective actions directly (via efferent) or indirectly (via reflexes).

AIMS: Present study was undertaken to elucidate the involvement of vagus in indomethacin-induced exacerbation of ARDS.

Material and Method: Respiratory excursions, ECG (for heart rate; HR) and blood pressure were recorded. PaO_2/FiO_2 ratio and pulmonary water content were also determined.

Results: OA produced immediate tachypnea followed by progressive bradypnea and death within 70 min. There was increase in pulmonary water content and decrease in PaO_2/FiO_2 ratio. HR and mean arterial pressure (MAP) showed progressive decrease. In vagotomized animals OA-induced tachypnea was not seen but OA-induced toxicity persisted. In indomethacin pretreated rats, OA produced an abrupt decrease in respiratory frequency, (RF) HR and MAP leading to death of the animals within 12 min. Pulmonary water content was increased in these animals. Bilateral vagotomy did not prevent the indomethacin-induced exacerbation of ARDS. However, vagotomy did not alter the OA-induced toxicity and the parameters were similar to OA only group.

Conclusions: Results of the present study indicate that vagally mediated mechanisms are not involved in indomethacin-induced exacerbation of ARDS; possibly involve chemically mediated mechanisms.

Keywords: ARDS, Vagotomy, Pulmonary edema, Indomethacin, Oleic acid

INTRODUCTION

Acute respiratory distress syndrome (ARDS) is a lethal condition associated with a hospital mortality of approximately 40%[1,2]. In earlier study, OA induced ARDS in rats was characterized by ventilatory changes, hypoxemia (decreased PaO_2/FiO_2 ratio), pulmonary edema and infiltration of inflammatory cells[3] as per ATS guidelines[4].

In a recent study, indomethacin exacerbated OA-induced ARDS leading to death of the animals within 10 min[5]. Eventhough the mechanisms of exacerbation were not identified, death of the animals within such a short duration indicates the involvement of neurally mediated mechanisms. Direct electrical stimulation of vagus is reported to attenuate inflammation[6,7,8]. Recently, vagus nerve stimulation modulated the inflammation in two different models of ARDS[9]. Furthermore, vagal C fibers are excited by pulmonary edema, a consistent feature of ARDS[6]. In addition, various inflammatory mediators are

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known to alter respiratory and cardiac function through vagally mediated mechanisms. Therefore, we postulated that indomethacin-induced exacerbation of ARDS is due to vagally mediated mechanisms. The present study was therefore undertaken to examine the involvement of vagus in indomethacin-induced exacerbation of ARDS.

MATERIAL & METHOD

Animals, anesthesia and recordings

Animal experiments were performed after obtaining clearance from Ethical Committee of the Institute of Medical Sciences, Banaras Hindu University, Varanasi, India. Urethane (1.5 g/kg, i.p.) anesthetized adult rats of Charles-Foster strain (175-225 g) were used. Dissection and cannulations were done as reported earlier[3,5]. Respiratory excursions, ECG and blood pressure were recorded. Recordings of blood pressure were used to compute the mean arterial pressure (MAP).

Determination of PaO_2/FiO_2 ratio

Arterial blood sample was collected 15 min after saline/OA/ethanol injection and was subjected to Roche OMNI gas analyzer as reported earlier[3] and PaO_2/FiO_2 ratio was determined[3].

Determination of pulmonary water content

Pulmonary water content was determined as reported earlier[11]. Briefly, at the end of experiment lungs were excised, weighed and dried to a constant weight. The difference between wet and dry weight was calculated to determine the pulmonary water content.

Drugs and solutions

OA was procured from Hi-Media laboratories, Mumbai, India; indomethacin and urethane were from Sigma Chemical Company, St. Louis MO, USA. The doses of OA and indomethacin were chosen according to our earlier report[6].

Experimental protocol

Animals were stabilized for 30 min before experimentation. The animals were divided into 6 groups. In saline control (n=6)/ vehicle control (ethanol only, n=4)/ OA only (n=4) groups, initial recordings of respiratory excursions, ECG (for heart rate, HR) and blood pressure were made. Then 75 μL of saline/ethanol/OA was injected i.v. and recordings were done for initial 5 min and then at intervals of 15 min (for 2 min) till 120 min or death of the animals.

In I+OA (n = 4) group, after initial recordings, indomethacin (10 mg/kg) was injected. 15 min later OA was administered. Subsequent recordings were done as mentioned earlier.

In V+I+OA group (n= 4), after initial recordings bilateral vagotomy was performed. After 15 min recordings were made, indomethacin (10 mg/kg i.v.) was injected and the recordings were made after 30 min. Subsequently OA was injected and recordings were made as mentioned earlier.

In V+OA group (n= 4), after initial recordings, bilateral vagotomy was done and 15 min later OA was administered. Subsequent recordings were done as mentioned earlier.

Analysis of data

The changes in RF, HR and MAP were expressed as % of initial. The data were pooled and mean ± SEM was calculated. The data were compared using two-way ANOVA. Students 't' test (for unpaired observation) was used for comparing pulmonary water content, PaO_2/FiO_2 ratio and survival time. A P value < 0.05 was considered significant.

RESULTS

OA produced features of ARDS

The basal RF in OA only group was 74±4.2 breaths/ min and was similar to control group (72±2.6 breaths/min). OA injection produced progressive increase in RF and by 30 min, it was 2 times greater than the initial value. After 30 min RF decreased progressively and all the animals died by 70 min (Fig. 1). In saline treated group, no significant change in the RF was observed and all the animals survived throughout the observation period (Fig. 1).

The pulmonary water content in OA treated animals was significantly greater than control group (Fig. 3). The PaO_2/FiO_2 ratio was significantly decreased (Table-2).

The basal HR and MAP in OA only group was 278±6.4 beats/min and 74±6.4 mmHg respectively and was similar to control group (272±4.2 beats/min and 72±4.4 mmHg). OA produced immediate (within 2 min) decrease in HR and MAP followed by slight recovery and subsequent fall till the death of animals (Fig. 2). In saline treated group, no significant change in the HR and MAP was observed

throughout the observation period (Fig. 2).

The survival time in OA only group was 62 ± 9.3 min and was significantly decreased as compared to saline control group (120 min; Table 2).

Indomethacin exacerbated OA-induced ARDS.

The basal RF in this group was 78.3±4.5 breaths/min. Indomethacin *per se* did not produce significant change in the RF. Administration of OA in indomethacin pretreated animals produced instantaneous decrease in RF leading to death of the animals within 12 min (Fig. 1). All the animals in vehicle control group survived throughout the observation period (Fig. 1).

The pulmonary water content in I+OA group of animals was significantly greater than vehicle control group but lesser than OA treated group (Fig. 4). The PaO_2/FiO_2 ratio in indomethacin treated (I+OA) group could not be measured as the animals died within 12 min. The PaO_2/FiO_2 ratio in vehicle control group was similar to saline control group (Table-2).

Indomethacin per se did not produce significant change in HR and MAP. Administration of OA in indomethacin pretreated animals produced abrupt decrease in HR and MAP till the death of animals (12 min, Fig. 2). All the animals in vehicle control group survived throughout the observation period (Fig. 2).

The mean survival time in this group was 6±3.8 min which was significantly lower than OA only group (Table 2).

Bilateral vagotomy failed to prevent indomethacin-induced exacerbation of ARDS

Vagotomy decreased the RF (about 40 %). OA injection produced instantaneous decrease in RF leading to death of the animals within 12 min in V+I+OA group also similar to I+OA group.

The pulmonary water content was similar to I+OA group (Fig. 3). It was significantly greater than vehicle control group but lesser than OA only group (Fig. 3). The PaO_2/FiO_2 ratio in this group of animals could not be measured as the animals died within 12 min.

Vagotomy produced slight increase in HR and MAP (about 3-5%). In this group of animals also, OA injection produced the changes similar to I+OA group. There was progressive decrease in HR and MAP till the death of the

animals (Fig. 2).

The survival time in this group was similar to I+OA group and was significantly lesser than OA only group (Table- 2).

OA-induced ARDS in bilaterally vagotomized rats

In bilaterally vagotomized animals, OA administration did not produce immediate tachypnea as seen in OA only group and RF remained at the same level up to 15 min. After 15 min RF decreased leading to respiratory arrest and death by 60 min (Fig. 1).

The pulmonary water content in this group of animals was similar to OA only group. It was significantly greater than control group (Fig. 3). The PaO_2/FiO_2 ratio in this group was similar to OA only group and was significantly lesser than saline control group (Table- 2).

OA injection decreased HR and MAP (about 38%) followed by slight recovery and then subsequent fall till death of the animals (Fig. 2).

The survival time in V+OA group was similar to OA only group and was significantly lesser than saline group (Table 2).

DISCUSSION

Results of this study show that exacerbation of OA-induced ARDS in indomethacin pretreated animals persisted even after bilateral vagotomy. Thus, the observations indicate non-involvement of vagally mediated mechanisms for indomethacin-induced exacerbation of ARDS.

ARDS is an acute condition associated with inflammation, pulmonary edema, altered respiratory frequency and hypoxemia. In earlier study we have reported ARDS in rats using OA injection[3] that exhibited the criteria described by ATS for animal models[4]. In the present study also OA (75µL i.v. bolus) produced ARDS similar to earlier study[3]. Further, in a recent study we have shown that indomethacin (a prostaglandin synthesis inhibitor) exacerbated OA-induced ARDS leading to death of the animals within 10 min[5]. Eventhough the exacerbation of ARDS by indomethacin is intriguing; the mechanisms of sudden death of the animals remain obscure.

The indomethacin-induced exacerbation may involve neurally or chemically mediated mechanisms. Lung is supplied by the vagus and vagal afferents and efferents are known to possess protective respiratory functions in

various physiological or pathological conditions. Earlier reports indicate that stimulation of vagus nerve decreased the lung permeability and neutrophil sequestration in rat model[12]. It is also shown that vagus nerve stimulation attenuates inflammation through the cholinergic anti-inflammatory pathway[13,14]. Further, various inflammatory cytokines, prostaglandins, histamine and pulmonary edema are known to excite the vagal afferents. Therefore we hypothesized that indomethacin-induced exacerbation may be operating via vagally mediated pathway either directly or indirectly by modulating the reflexes. Absence of initial tachypnea after OA injection in bilaterally vagotomized rats indicates abolition of reflex pathway (Fig. 1). This observation substantiates the involvement of vagally mediated mechanism in producing initial tachypnea after OA injection. In vagotomized animals, indomethacin exacerbated the ARDS similar to intact animals. Thus, vagally mediated reflexes do not seem to be involved in indomethacin-induced exacerbation of ARDS. Abrupt decrease in the RF and death of the animals within such a short duration (12 min) indicate the role of centrally mediated mechanism. Parallel decrease in HR and MAP supports this hypothesis.

Respiratory centers are located in the ponto-medullary region and they are modulated by various neural or chemical inputs. Indomethacin per se did not alter the respiratory rhythm either in intact or vagotomized animals (Fig. 1). However, when challenged with OA, there was sudden decrease in respiratory and cardiac activity. The possible underlying mechanisms are not clear but can be explained as below. OA produces inflammation and increases the pro-inflammatory as well as anti-inflammatory mediators. In the absence of prostaglandins in indomethacin pretreated group, exacerbation in OA-induced toxicity indicates that prostaglnadins possess anti-inflammatory actions. It is to recall here that indomethacin inhibits only the cyclooxygenase pathway (synthesize prostaglandins) but not the lipooxygenase pathway (forms leukotrienes). In normal physiological conditions, prostaglandin and leukotrienes are supposed to counterbalance the actions of each-other. OA challenge in indomethacin pretreated group may lead to accumulation of leukotrienes due to unopposed action by prostaglandins. Leukotrienes have been implicated as pro-inflammatory mediators of acute lung injury[15]. Thus, it is possible that increased level of leukotrienes after OA administration, directly or indirectly inhibit the medullary vital centers resulting in respiratory arrest and death of the animals. Simultaneos deterioration

in other cardiopulmonary parameters supports this hypothesis. Further, the inability of vagotomy to alter the indomethacin-induced toxicity also support the non-involvement of vagally mediated mechanisms.

Thus, results of the present study indicate that indomethacin increased the OA-induced toxicity. The indomethacin-induced exacerbation is not vagally mediated. Increased accumulation of pro-inflammatory mediators over anti-inflammatory mediators may possibly suppress medullary vital centers to depress respiration. Further research is required to delineate the exact mechanism.

Table-1: Effect of vagotomy on cardiopulmonary parameters from 4-6 experiments.

Parameters	Respiratory frequency (RF/min)	Heart rate (HR; beats/ min)	Mean arterial pressure (MAP; mm Hg)
Before vagotomy	76.4 ± 4.2	244 ± 14.3	86.2 ± 3.2
After vagotomy	$30.4 \pm 2.2^*$	258 ± 9.1	89.4 ± 2.04

Asterisk (*) indicates $P<0.05$ as compared to before values (Students t test) .

Table- 2: The mean $\pm$ SEM values of survival time and PaO_2/FiO_2 ratio in various groups.

Group	Survival time (min)	PaO_2/FiO_2 ratio
Saline (n=6)	>120	458.5 ± 9.6
OA only (n=4)	62 ± 9.3	176.3 ± 8.4
I+OA (n=4)	$06 \pm 3.8^*$	NT
Ethanol only (n=4)	>120	466.3 ± 5.6
V+I+OA (n=4)	$06 \pm 4.3^@$	NT
V+OA (n=4)	$58 \pm .4.1$	182.1 ± 6.3

NT = not tested. I+OA, indomethacin + OA group; V+I+OA, bilateral vagotomy + indomethacin + OA group; and V+OA group, bilateral vagotomy + OA group. '*'indicates $P<0.05$ as compared to OA only group and '@' indicates $P<0.05$ as compared to V + OA group ($P< 0.05$; Student's t test for unpaired observations).
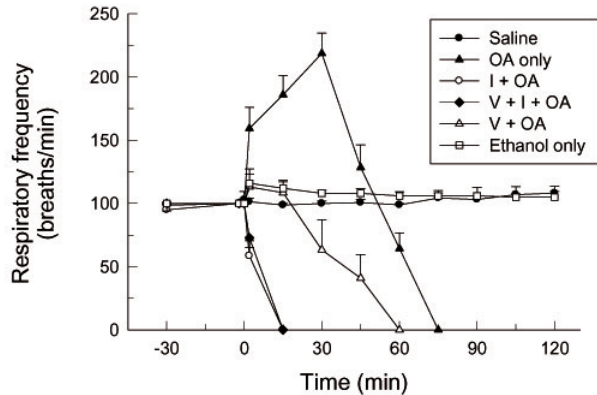
Fig. 1 Effect of OA (75 µL) on respiratory frequency in various groups. Each point depicts mean ± SEM values from 4-6 experiments. I+OA, indomethacin + OA group; V+I+OA group, bilateral vagotomy + indomethacin + OA group; and V+OA group, bilateral vagotomy + OA group. Saline/OA/Ethanol was injected at "0" time. The changes in I+ OA/V+ I+OA groups are significantly different from OA only/V+OA groups (P < 0.05, Two-way ANOVA).
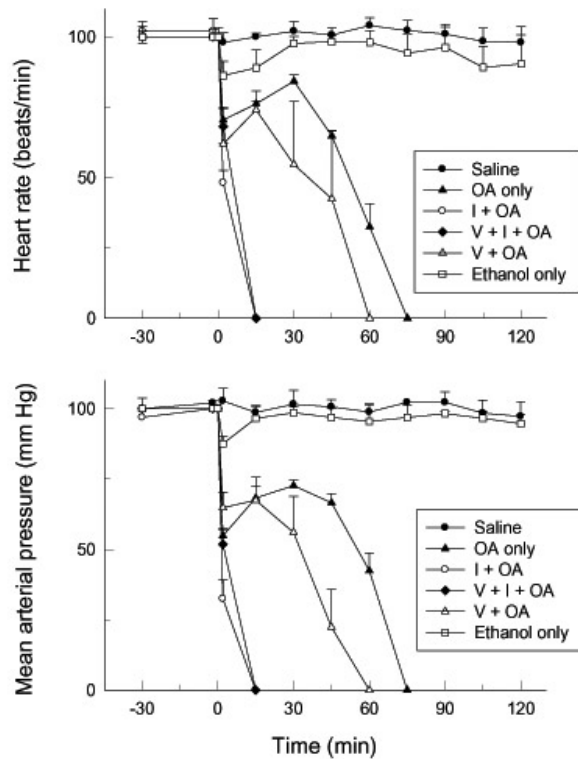
Fig. 2 Effect of OA on heart rate and mean arterial pressure in various groups. Each point depicts the mean ± SEM values from 4-6 experiments. I+OA, indomethacin + OA group; V+ I+OA group, bilateral vagotomy + indomethacin + OA group; and V+OA group, bilateral vagotomy + OA group. Saline/OA/ Ethanol was injected at "0" time. The changes in I+OA/V+I +OA groups are significantly different from OA only/V+OA groups (P < 0.05 Two-way ANOVA).
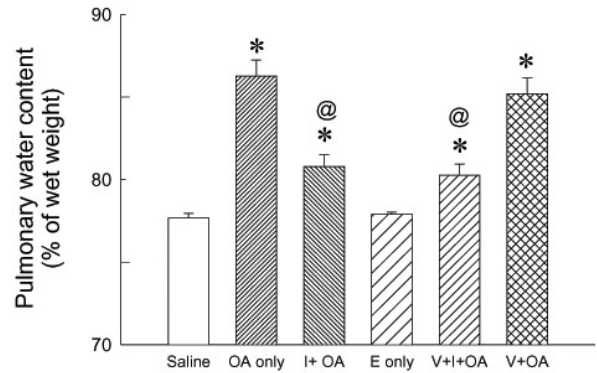
Fig. 3 Effect of OA (75 µL) on pulmonary water content, in various groups. Each bar depicts mean ± SEM from 4-6 experiments. I+OA, indomethacin + OA group; E only, ethanol only group; V+I+OA group, bilateral vagotomy + indomethacin + OA group; and V+OA group, bilateral vagotomy + OA group. Asterisk (*) indicates P<0.05 from saline control group and "@" indicates P<0.05 from OA only/ V+OA group (unpaired Student's t test).

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Role of Yoga in Achieving Glycaemic Control in Patients of Type 2 Diabetes Mellitus (DM)

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ABSTRACT

Background: This study was conducted to see the role of Yoga in achieving glycaemic control in diabetic subjects.

Method: Out of 77 patients of diabetes, 36 were in group 1st (control group) and 41 patients were in group 2nd (study group). Yogic exercises were practiced by study group for 3 continuous months.

Result: The comparison of glycaemic control i.e. FBS and GHb before yoga treatment was statistically insignificant ($t = 1.103$, $p > 0.05$; $t = -1.439$; $p > 0.05$ respectively). After 3 months of yoga, comparison of glycaemic control i.e. FBS and GHb of two groups was statistically significant ($t = 4.297$; $p < 0.001$; $t = -2.097$; $p < 0.05$ respectively).

Conclusion: There is significant improvement in glycaemic control (Fasting blood sugar and Glycosylated hemoglobin).

Keywords: Yoga, Diabetes mellitus, Glycaemic control, Insulin.

INTRODUCTION

Diabetes mellitus is a syndrome characterized by chronic hyperglycemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency in insulin secretion and/or insulin action. With a setting of low physical activity, it predisposes strongly to obesity which is an important independent risk factor for type 2 diabetes mellitus by increasing insulin resistance (TNF alpha which is secreted by adipose tissue and may induce insulin resistance[1]). The truncal obesity is particularly responsible for insulin resistance and glucose intolerance[2]. Regular exercise and physical training can enhance insulin sensitivity[3]. Poor glycaemic control is associated with higher levels of stress in both adolescent[4] and adults[5]. Stress also affects metabolic control directly by stimulating the autonomic nervous system to initiate the neuroendocrine stress response that tends to produce hyperglycemia[6]. Depression and anxiety are usually associated with poorer metabolic control[7].

Exercise training increases the proportion of insulin sensitive fibres in muscle as well as increasing fat oxidative enzyme activity, and both these changes favour the utilization of fat as the fuel. Training activates lipolysis more in visceral than in subcutaneous fat[8]. Physical training increases muscle GLUT-4 content[9] and insulin sensitivity in subjects with type 2 diabetes mellitus. During intensive training programmes, glycaemic control also improves. HbA1 may fall by 1.0-1.5% after 6 weeks of training due to cumulative effect of individual bouts of exercises[10]. Controlled exercise programme may also improve dietary compliance which may also contribute to glycaemic control[11]. Improvement is more likely in patients with high insulin secretory capacity, in whom insulin resistance is the major cause of diabetes[12].

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AIM AND OBJECTIVES

To see the role of yoga in achieving glycaemic control (fasting blood sugar and glycosylated haemoglobin) in patients of type 2 Diabetes mellitus (DM).

MATERIAL & METHOD

The study was conducted in post graduate department of Medicine in S. N. Medical College, Agra. In this study initially we had screened 100 patients randomly but 23 patients were excluded who lost to follow up in subsequent visit. Hence this study was conducted in 77 patients of diabetes mellitus who were either attending out patient or in patient department or diabetic clinic of S.N Medical college, Agra. Out of 77 patients of diabetes, 36 were in group 1st (control group) and 41 patients were in group 2nd (study group). A detailed clinical history was taken especially the past history of disease and of medication.

Exclusion Criteria :

- Person unwilling to participate
- H/o liver 'or Kidney disease
- Pregnant females
- Diabetics >8 yr. of history of diabetes
- Hypo/hyperthyroidism
- Any other endocrine disorder

Diagnostic Criteria :

For diabetes :

- Fasting Blood glucose level (BGL) > 126 mg/dl (7.0 mmol/L) on two separate occasions.

- Post Prandial BGL > 200 mg/dl (11.1 mmol/L).

- A random plasma glucose level of 200 mg/dl (11.1 mmol/L) or more.

Patient examination:

Group 1st : These patients took conventional treatment and unsupervised exercise protocol at home and serve as control group.

Group 2nd : These patients besides conventional treatment were gone through the supervised exercise protocol. It served as study group. Following yogic exercises were practiced daily or at least 5 times a week for continuous 3 months :

1. Health rejuvenating exercises (5 minutes)

2. Body posture (Asanas)

a. Surya namaskar/parmeshwar vandana (3 minutes)

b. Paschimottanasana (3 minutes)

c. Ardhamatsyasana (3 minutes)

d. Uttanpadasana (3 minutes)

e. Sarwangasana (3 minutes)

f. Matsyasana (3 minutes)

3. Abdomen exercise (7 minutes)

4. On every alternate day either :

a. Relaxation exercises (kayotsarga) (30 minutes) or

b. Preksha meditation including pranayama and anupreksha (30 minutes).

OBSERVATION AND RESULT

TABLE-1: Age and Sex distribution

Parameters		Group 1st (n=36)		Group 2nd (n=41)		t	P
		Mean	SD	mean	SD		
Age (yrs)		49.90	10.98	53.00	7.98	1.710	<0.10
Sex (M/F)		12F	24M	11F	30M	$\chi^2$0.774	NS
Glycaemic control	FBS(mg/dl)	190.39	29.43	183.91	39.26	1.103	NS
	GHb(%)	9.16	0.82	9.35	1.02	-1.439	NS

Group 1st = control group; group 2nd =study group

TABLE-2: Comparison of glycaemic control of two groups at pre treatment

Parameter	Group 1st			Group 2nd			t	P
	Mean	SD	SE	Mean	SD	SE		
FBS	190.39	29.43	3.47	183.91	39.26	4.33	1.103	NS
GHb	9.16	0.82	0.09	9.35	1.02	0.11	-1.439	NS

The comparison of glycaemic control i.e. FBS and GHb before yoga treatment was statistically insignificant (t = 1.103, p >0.05; t = -1.439; p>0.05 respectively).

TABLE-3: Comparison of glycaemic control of two groups at post treatment

Parameter	Group 1st			Group 2nd			t	P
	Mean	SD	SE	Mean	SD	SE		
FBS	172.21	27.13	3.20	150.66	34.21	3.78	4.297	<0.001
GHb	8.22	1.13	0.13	8.58	0.97	0.12	-2.097	<0.05

After 3 months of yoga, comparison of glycaemic control i.e. FBS and GHb of two groups was statistically significant (t = 4.297; p<0.001; t = -2.097; p< 0.05 respectively).

TABLE-4: Comparison of glycaemic control in group 2nd at pre-treatment and post-treatment

Parameters	FBS		GHb	
	0 month	3 months	0 month	3 months
Mean	183.91	150.66	9.35	8.58
SD	39.26	34.21	1.02	0.97
SE	4.33	3.78	0.11	0.12
t	9.129		13.237	
p	<0.001		<0.001	

The comparison of glycaemic control in group 2nd i.e. FBS decreased from 183.91±39.26 mg/dl to 150.66±34.21 mg/dl and GHb deceased from 9.35±1.02% to 8.58±0.97%. This was statistically significant (t = 9.126; p < 0.001, t = 13.237; p < 0.001 respectively).

DISCUSSION

This study clearly shows that there is a definite role of life style modification in glycaemic control. In group 2nd after 3 months of yoga treatment blood sugar came down from 183.91±39.26 mg/dl to 150.66±34.21 mg/dl (p<0.001) and GHb decreased from 9.35±1.02% to 8.58±0.97% (p< 0.001). When we compare between control and study groups there is also a statistically significant improvement in fasting blood sugar (p < 0.001) and GHb (p < 0.05).

CONCLUSION

So the conclusion of study is that, there is significant improvement in glycaemic control (Fasting blood sugar and Glycosylated hemoglobin).

Conflict of Interest: None.

Source of Funding: Self.

Ethical Clearance: Taken from college ethical committee.

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Study of Role of Serum Proteins in Viral Hepatitis A & B

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ABSTRACT

Aims and Objective: To assess changes in serum proteins namely albumin and globulin in cases of viral hepatitis and to establish the diagnostic and prognostic role of serum proteins in viral hepatitis.

Material & Method: The study group consisted of 400 cases of viral hepatitis. Their age were between 16-55 years. As control 50 healthy persons were selected among attendant of patients and volunteers, they were of match age group and sex with study group and belonging to same geographical areas. Study group was comprised of both viral hepatitis A and viral hepatitis B cases. Medical history, physical & clinical examination were performed for all participants. The data of all groups was compared.

Results: Among study group, affected by Viral hepatitis A & B, decrease in Albumin and rise in globulin level were observed compared to control group. Change in albumin ,globulin level are significant compare to control (P<0.01)

Conclusion: The present study highlights the diagnostic and prognostic roles of albumin and globulin levels in patients of viral hepatitis A & B.

Keywords: Albumin, globulin, viral hepatitis.

INTRODUCTION

Viral hepatitis is a global health problem, causing considerable morbidity and mortality, both from acute and the chronic sequelae. The major hepatotropic human viruses are hepatitis A, hepatitis B, hepatitis C, hepatitis D (which can only infect people infected from hepatitis B virus) and hepatitis E. Globally over 850 million are chronic carriers of hepatitis B and C and account for over 2 million deaths per year.

Hepatitis A, one of the oldest diseases known to humankind, is a self-limited disease which can take a wide spectrum of clinical courses ranging from asymptomatic or subclinical infection to cholestatic presentation or even to fulminant liver failure. Hepatitis A infection occurs worldwide sporadically or in epidemic outbreaks.

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It is transmitted and spread via the faecal-oral route[6]. The incidence of hepatitis A is 1.5 per 100,000 in industrialized countries e.g., the United States or Germany[16], is low compared to developing countries (parts of Africa, Asia, Central and South America) where it may reach up to 150 per 100,000 per year.

Hepatitis B is a parenterally transmitted DNA viral infection having longer incubation period (6 weeks -6 months) and protracted course and variable outcome ranging from acute self limited illness to progressive chronic disease ending in cirrhosis and hepatocellular carcinoma. It replicates in the liver and causes hepatic dysfunction[8]. During hepatitis B infection many virus particles are released from infected liver cells, resulting in large amount of viral antigen entering the blood. Hepatitis B surface antigen (HBsAg) is present in about 2 weeks before the onset of symptoms and persists throughout the course of the disease[9]. Persistence of HBsAg beyond six months indicates chronic infection or carrier state [9]. Hepatitis B virus is not directly cytophatic and the liver damage produced is by the cellular immune response of the host [2,10,15] .Specific failure of T cells to recognize

HBV antigen leads to viral persistence . Increased serum level of Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) is a reflection of hepatocellular injury and tends to rise 1 – 2 weeks before the onset of jaundice [8]

Pathogenic mechanism of hepatic dysfunction in viral hepatitis:

The liver has remarkable capacity to carry out a wide variety of synthetic, storage, excretory, and metabolic activities. Plasma albumin and fibrinogen are exclusively formed in the liver. The decrease in hepatic function is less the result of a decrease in the mass of hepatic function tissue, but rather more the result of ineffective and impaired function of surviving cells. Most responsible for reduced hepatic function are injury to the hepatocellur endoplasmic reticulum and impaired blood exchange in the liver, partly because of large barrier between the blood and the cells, partly because of impaired blood flow owing to the presence of inflammatory cells in and around sinusoids[3]. A marked fall in serum albumin usually indicates severe hepatocellular injury, especially when it occurs early in acute liver disease. In infectious hepatitis, for example, it may be an early sign of progression to acute or subacute necrosis of the liver. A rising serum albumin, on the other hand, is a most reliable sign of improving liver function and usually portends a favorable outcome. In the differential diagnosis of jaundice, the finding of a decreased serum albumin or of an increased globulin, favour an hepatocellular etiology. In general, the serum proteins are little changed in obstructive jaundice.

AIMS & OBJECTIVE

•   To assess changes in serum proteins namely albumin and globulin in cases of viral hepatitis.

•   To establish the relationship between severity of hepatitis with level of proteins.

•   To establish the diagnostic and prognostic role of serum proteins in viral hepatitis.

MATERIAL & METHOD

The present work was carried on patients of viral hepatitis admitted in medicine ward & from medicine OPD of PMCH, Patna. The study group consisted of 400 cases of viral hepatitis. Their age were between 16-55 years.As control 50 healthy persons were selected among attendant of patients and volunteers . Before doing the study its nature and aim had been explained to the patients and their relatives and consent was taken. Based upon the serum bilirubin level ,viral hepatitis A and B cases were further divided into groups in following manners:-

Group A:100 cases of viral hepatitis A with their serum bilirubin level upto 10 mg%.

 Group B : 100 cases of viral hepatitis A with serum bilirubin level above 10 mg%.

Group C : 100 cases of viral hepatitis B having serum bilirubin level upto 10 mg%.

Group D : 100 cases of viral hepatitis B having serum bilirubin above 10 mg%.

Diagnostic criteria of viral hepatitis was presence of signs and symptoms of viral hepatitis like abdominal pain, nausea, vomiting, anorexia, fever, icterus and hepatomegaly, Abnormal liver function test ,Serum bilirubin , Prothrombin time Serological markerHbsAg, IgM HBc antibody and IgM HAV antibody

Total serum protein and Serum albumin and globulin were estimated in both cases and controls by the Biuret method described by Wooten (1964).percentage of albumin and globulin were known by the elution method, the amount of albumin and globulin calculated in gram percent.

OBSERVATION & RESULTS

Table-1: Albumin ,globulin and total protein of cases & controls at the time of admission

Case	Albumin(gm/dl)			Globulin(gm/dl)			Total protein(gm/dl)		
	Range	Mean	S.D	Range	Mean	S.D	Range	Mean	S.D
Control	3.6-4.9	4.2	0.343	2.4-3.2	2.8	0.225	6.6-7.5	7.1	0.234
Group A	2.8-4.5	3.72	0.415	2.5-4.2	3.19	0.37	6.4-7.3	6.92	0.244
Group B	2.4-3.9	3.27	0.344	2.8-4.3	3.57	0.333	6.4-7.3	6.84	0.26
Group C	2.8-4.3	3.62	0.341	2.7-4.1	3.34	0.353	6.5-7.3	6.98	0.192
Group D	2.4-3.9	3.19	0.313	3-4.3	3.72	0.302	6.4-7.2	6.92	0.188

Maximum no of cases of viral hepatitis were found in age group 16-25[13] followed by 26-35 age group. The proportion of the older patients was comparatively more in severe cases of viral hepatitis (Group B and Group D)[5]. Incidence was more in male than female. jaundice was present in 100 % of cases. common presenting features were anorexia, nausea/vomiting ,Arthralgia ,Myalgia ,pain abdomen & Hepatomegaly .In control group albumin value was in the range of 3.6-4.9 gm/dl with mean value of albumin 4.2 gm/dl, whereas average range of globulin was 2.4 -3.2 gm/dl with mean value of 2.8 gm/dl. The mean value of albumin in Group A,Group B ,Group C and Group D were 3.72 gm/dl,3.27 gm/dl,3.62 gm/dl and 3.19 gm/dl respectively. The mean value of globulin in Group A, Group B, Group C and Group D were 3.19 gm/dl, 3.57gm/dl, 3.34gm/dl and 3.72 gm/dl respectively. In control group protein value was in the range of 6.6-7.5 gm/dl with mean value 7.1 gm/dl , whereas mean value of protein was 6.92gm/dl, 6.84 gm/dl ,6.98 gm/dl and 6.92 gm/dl in Group A, B, C and D respectively. Results of Follow up Studies in All Group :

Table-2: Albumin, globulin and total protein of cases & controls after 20 days follow up

Case	After 20 days follow up					
	Albumin(gm/dl)		Globulin(gm/dl)		Total protein(gm/dl)	
	Mean	S.D	Mean	S.D	Mean	S.D
Group A	3.9	0.321	3.07	0.326	6.97	0.239
Group B	3.39	0.289	3.46	0.277	6.85	0.242
Group C	3.79	0.32	3.19	0.373	6.98	0.252
Group D	3.32	0.265	3.58	0.278	6.91	0.16

A follow up study was done in all group cases after 20 days . All 100 cases of each group could not be studied because some patient left the hospital in between because they were clinically much better before 20 days and some of them died (12 from group B and 20 from Group D) due to fulminant hepatic failure. Total 70 from Group A,73 from Group B ,71 from Group C and 77 from Group D could be studied.

Table-3: Statistical analysis control versus different Groups

	t-value			P-value		
	Albumin	Globulin	Total Protein	Albumin	Globulin	Total Protein
Control Versus **Group A (mean value)**	17.88	31.98	15.26	<0.001	<0.001	<0.001
Control Versus Group B (mean value)	16.33	48.24	5.30	<0.001	<0.001	<0.001
Control Versus Group C (mean value)	10.14	9.83	2.81	<0.001	<0.001	<0.01
Control Versus Group D (mean value)	18.61	18.87	4.49	<0.001	<0.001	<0.001

DISCUSSION

The above characteristic changes in Serum protein (albumin & globulin) in the study may be explained that in inflammation the change in serum protein levels are the expression of acute phase response. The APR is accompanied by clinical signs & symptoms (fever, malaise, fatigue, swelling & pain etc) that may not become evident until after detectable protein changes have occurred[4]. In the APR characteristic changes in hepatic protein synthesis includes decrease in albumin production, transferring, prealbumin [1]. While a normal APR may be seen in early infection in acute viral hepatitis later disharmonic changes in many acute phase protein are due to the inhibitory effects of viral insult on hepatic protein synthesis resulting in fall in albumin[17].

The increase in the level of globulin cannot be explained very clearly. This increase is not only due to antibody formation but also due to increase in number of plasma cells in the bone marrow and even in the liver . Intra hepatic mesenchymal reaction to injury with production of globulin by liver histiocyte and kuffer cells has also been suggested.

SUMMARY & CONCUSION

The following points have been inferred from the study group patients:

Fall of albumin and increase in globulin level were found in all Groups compare to control but these changes are more significant in viral hepatitis A & B patients with serum bilirubin value more than 10 mg/dl[11].

Follow up study of these cases infered that serum albumin increased and globulin level decreased in significant number of all Group. study indicates that more severe the hepatic insufficiency, the greater is the impairment of albumin production A rising serum albumin is a reliable sign of improving liver function and usually shows a favourable outcome. Hence serial estimation of serum protein help to assess the prognosis In viral hepatitis.

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A Cross Sectional Study of Serum Lipid Profile in Sedentary and Physically Active Hypertensive Individuals

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ABSTRACT

Hypercholesterolemia is associated unequivocal with increased incidence of premature IHD. The major independent risk factor for coronary artery disease includes hypercholesterolemia, low level of HDL cholesterol, Hypertension and cigarette smoking. Systemic arterial hypertension is one of the most common cardiovascular diseases causing significant morbidity and mortality.

The aim of present study was to find out the changes in serum lipid profile in sedentary and physically active hypertensive individuals. The present study was conducted on 50 hypertensive patients attending the OPD, deptt. of Medicine, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand between July to December 2004. The mean serum total cholesterol, serum triglyceride, serum VLDL – cholesterol and serum LDL – cholesterol level are significantly($p<0.05$) higher in hypertensive sedentary individuals than physically active individuals. Both systolic and diastolic blood pressure were found insignificantly higher in sedentary than physically active individuals.

Keywords: *Serum lipid profile, arterial blood pressure, sedentary and physically active hypertensive individuals*

INTRODUCTION

Hypercholesterolemia is associated unequivocal with increased incidence of premature IHD. The major independent risk factor for coronary artery disease includes hypercholesterolemia, low level of HDL cholesterol, Hypertension and cigarette smoking. Although each risk factor contributes to the development of atherosclerosis; the interaction among risk factors complicated the condition. Hypertension is more apt to cause cardiovascular disease in person with added risk factors such as elevated serum cholesterol[1]. In the Multiple Risk Factor Intervention Trial (MRFIT), men with cholesterol level above 240ml/dl had more than a three – fold increase in risk of IHD death compared to men with cholesterol levels below 200mg/dl.

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Systemic arterial hypertension is one of the most common cardiovascular diseases causing significant morbidity and mortality. Framingham study indicate that risk of coronary heart disease and stroke increases two to three fold with systolic blood pressure equal to or greater than 160 mm Hg or diastolic blood pressure equal to or greater than 95 mmHg. Even borderline hypertension increases rate of coronary heart by 50%.

MATERIALS & METHOD

The present study was conducted on 50 hypertensive patients attending the OPD, deptt. of Medicine, Rajendra Institute of Medical Sciences, Ranchi between July to December 2004. This study included both sedentary and physically active persons of age group 35-60 years having a systolic blood pressure in the range of 140 - 200 mm of Hg and diastolic pressure in the range of 90 – 110 mm of Hg i.e. mild to moderate hypertension.

These patients were neither undergoing any treatment nor any dietary restrictions. The patients with a history of Addiction, personal or family history of Diabetes, Asthma and Tuberculosis were excluded from the study. The arterial

blood pressure of each patient was measured by Diamond's mercury sphygmomanometer.

Anthropometric measurements:

Height, Weight, Body Mass Index, and Waist Hip Ratio

BLOOD COLLECTION

Blood samples were collected after an overnight fast of 10 – 12 hours. About 5ml of blood was withdrawn between 9:00AM to 11:00AM in a dry autoclaved disposable syringe and poured in sterilized plain vial after removing the needle and allowed to clot and then centrifuged to separate the serum. the serum was stored at 2 – 6°C for a period of 2 – 3 days in refrigerator until they were analyzed.

Analysis was done for total cholesterol, triglyceride and HDL – cholesterol.

Principle:

Serum low density and very low density lipoprotein are selectively precipitated by Mg^{++} phosphotungustate and removed by centrifugation, cholesterol measured using enzymatic procedure[2]. Triglyceride was measured by determining the amount of glycerol liberated after hydrolysis of triglycerides by saponification with alcoholic potassium hydroxide. The liberated glycerol was oxidized by potassium metaperoxidate to formaldehyde and the excess oxidants were destroyed by reduction with sodium arsenide. The formaldehyde thus produced was determined photometrically by the chromotropic acid colour reaction. The lipid extract of serum must therefore be freed from other sources of glycerol in particular phospholipid and from glucose which on oxidation can also yield formaldehyde. Salicylic acid was used to absorb these interfering substances from the isopropyl ether solution.

Estimation of serum lipid profile:

Serum HDL Cholesterol, serum Total Cholesterol & serum Triglycerides were measured by semi-autoanalyser in the deptt. of Biochemistry, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.

The quantitative in vitro diagnostic measurements of the serum HDL cholesterol was done by Liquizyme HDL cholesterol direct reagent kit (code no. S10 & expiry date 06/05/2005) manufactured by Beacon Diagnostics Pvt.Ltd., 424, New GIDC, Kabilpore, Navsari-396424, India.

The quantitative in vitro diagnostic measurements of serum total cholesterol and serum total cholesterol were done by using du cofferret/kits (CHSL-0507/CHSL-0707/ CHOL-0055 & expiry date 15/05/2005) and (TGML-0427/0517/0707/TRIG-0055 & expiry date 10/06/2005) respectively. These kits were manufactured by ELITech Clinical Systems SAS-Zone Industrielle- 61500 Sees France.

VLDL–cholesterol and LDL– cholesterol were estimated using Friedewald's equation[2].

STATISTICAL ANALYSIS

The mean difference of each parameter in both the groups was tested for significance by applying unpaired students 't' test. All statistical tests were done by SPSS version 12.

OBSERVATIONS AND RESULTS

The present study was conducted on 50 hypertensive OPD patients of 35- 60 years age with an average of 46.06±8.20 years in RIMS, Ranchi, Jharkhand. Estimation of serum lipid profile were done in between July to December 2004.The mean serum total cholesterol, serum triglyceride, serum VLDL – cholesterol and serum LDL – cholesterol level are significantly higher in hypertensive sedentary individuals than physically active persons(table*1*). HDL cholesterol is higher in physically active than sedentary hypertensive individuals. Both systolic and diastolic blood pressure were found insignificantly higher in sedentary than physically active individuals(table*2*).

Table 1. Serum lipid profile in Sedentary and Physically active hypertensive individuals

Serum lipid profile (in mg/dl)	Sedentary (n=25) Mean±SD[*5]	Physically Active (n=25) Mean±SD	p value
Total - CH[*]	277.2±33.29	263.3±14.97	<0.05(S[*6])
HDL[*1]- CH	31.4±1.34	34.6±3.17	>0.05(NS[*7])
TG[*2]	200.25±4.77	169.83±0.28	<0.05(S)
VLDL[*3]- CH	40.0±11.02	34.0±6.06	<0.05(S)
LDL[*4]- CH	205.8±33.69	197.71±2.35	>0.05(NS)

*total cholesterol

*[6]significant

*[1]high density lipoprotein

*[7] not significant

*[2]triglyceride

*[3] very low density lipoprotein

*[4] low density lipoprotein

*[5] standard deviation

Table 2. Arterial blood pressure in Sedentary and Physically active hypertensive individuals

Arterial Blood Pressure (in mm of Hg[#])	Sedentary (n=25) Mean+SD	Physically Active (n=25) Mean+SD	p value
SBP*	177.28±16.28	165.12±13.68	>0.05(NS)
DBP**	101.28±5.41	97.04±3.87	>0.05(NS)

#mercury

*systolic blood pressure

**diastolic blood pressure

DISCUSSION

Total cholesterol, triglycerides, VLDL – cholesterol and LDL cholesterol levels showed changes in the same direction whereas serum HDL- cholesterol level changes in the reverse direction.

HDL cholesterol protects the individual from hypertension and its consequences. The independent protective effect of HDL cholesterol or in risk of coronary heart disease, especially the total cholesterol: HDL cholesterol ratio is well known[3]. Physical activity and physical fitness have been related to improvement in the lipid profile. physical activity has been described as "an agent with lipid-lowering, antihypertensive, positive inotropic, negative chronotropic, vasodilating, diuretic, anorexigenic, weight-reducing, cathartic, hypoglycemic, tranquillizing, hypnotic and anti-depressive qualities[4]."

An intensity threshold for physical activity in term of its association with serum lipids has been observed: Physical activities with an intensity above

7 Kcal/minute are associated with higher HDL cholesterol and a lower atherogenic index[5].

Atherosclerotic heart disease is the leading cause of mortality among patients with chronic kidney disease. Chronic kidney disease is associated with dyslipidemia which seems to persist as renal failure advances[6,7,8].

E. Ritz et al[9] and A.C. Goldberg et al[10] suggested that, in dealing with hyperlipoproteinemia, the first principle is the provision of a diet and the maintenance of a good exercise and physical fitness program.

Patients were randomized into comparable exercising and sedentary control groups. All training sessions were held indoors, 3 times weekly for a mean of 12±4(SD) months, on a 17 lap/mile track. The result showed that maximum oxygen uptake significantly increased 21% and the duration for the graded exercise stress test significantly improved 19% in exercising group but did not change in controls[10].

The observation of the present work are sufficient to warrant the inclusion of estimation of serum lipid profile in high risk groups, so that hypertension, a preventable condition, can be omitted by adopting preventive measures such as increase in physical activity, dietary changes, use of polysaturated fatty acids etc. These measures reduce the incidence of hypertension and its complication e.g. coronary heart disease.

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Assessment of Status of Depression and Anxiety among Infertile Women in Chennai

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ABSTRACT

Introduction: According to WHO, infertility can be defined as the failure to achieve pregnancy after 12 months or more of regular unprotected sexual intercourse. Mental health describes a level of psychological well-being, or an absence of a mental disorder.

Objective: To determine the Level of depression and anxiety among infertile and fertile women and make a comparison among the same.

Materials and Method: The study was carried out in a female infertility clinic inKilpauk Medical College Hospital, Chennai. A psychological survey was performed on 50 infertile women. The survey was in the form of a questionnaire-Beck Depression Inventory II and Hospital Anxiety and Depression Scale. The questionnaire included the patient's demographic details, gynaecological history and the psychological impact on the patient. 100 fertile women were taken as controls and the 2 groups were compared on the criteria- age and marital duration.

Result: The result showed significant level of anxiety and depression among infertile women as compared to fertile one, the collected data was analysed and the level of depression and anxiety was obtained.

Conclusion: Authors found that, the highlevels of psychiatric morbidity is associated with infertility. This study is to reinforce the gynaecologists and healthcare professionals to look for psychosocial distress in women undergoing fertility treatment.

Keywords: *Female Infertility, Mental Illness, Depression and Anxiety.*

INTRODUCTION

Infertility has potentially inappropriate effects on quality of life in infertile women infertility is such a problem which affects almost all segments of the society; it is out bound of all social cultural and financial barriers. This issue not only disturbs women psychologically and also causes emotional and mental disturbances. According to WHO, infertility can be defined as the failure to achieve pregnancy after 12 months or more of regular unprotected sexual intercourse. Infertility refers to a biological inability of women to contribute in the process of conception. Definitionof infertility varies for demographic variations but can be divided commonly into two types primary and secondary. The women with primary infertility have never been able to conceive and while secondary infertility refers to the women who has difficulty in conceiving after once being conceived. Mental Health can be defined as a level of psychological well- being, or an absence of a mental disorder. Human fertility depends on various factors such as nutritional status, socio-economic status, any hormonal problems culture and the way of life. The fertile period for women is usually at its peak in early 20s and slowly

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drops when it in mid30s. There are many studies which are done before and show that the levels of depression and anxiety are high in infertile women. [4-10]On the other hand, there are some studies that show that there is no statistically significant difference between the depression and anxiety levels of both fertile and infertile group.[11-13]Most infertile individuals experience stress and tension and are less satisfied with their lives than their fertile counterparts. [7] Infertility has adverse effects on mental, communicational, and sexual health in these individuals. [8] Mostly the former generations, still believe that infertility is exclusively limited to female causes, which also causes the level of social insecurity in such female.[1, 2,3]Thus, women labelled as infertile feel disgrace and fault leading to anxiety and depression.There are various studies on infertility that associated anxiety and depression published mostly in developed countries. Most of the studies from developing world indicated to social aspects of infertility. [9, 11] The negative social and economic consequences due to infertility mainly affect the women.[10] It is very essential to understand the magnitude of stress such women. With an overview of this problem the present study was planned to assess the level of depression and anxiety among infertile and to compare it with fertile women.

MATERIALS AND METHOD

Study design

This is a cross-sectional type of studyin two groups to examine difference of mental health status and was analysed by percentage distribution.

Methodology

This study was conducted in an infertility clinic in Kilpauk Medical College and Hospital, Kilpauk, Chennai-600010. Prior Ethical clearance was obtained from the ethical committee before the study was initiated. 50 infertile women were randomly selected for the study. After obtaining proper consent from the patients, the study was performed in the form of two questionnaires-Beck Depression Inventory II and Hospital Anxiety and Depression Scale. Along with the questionnaires, proforma was given which included the patient's demographic details, gynaecological history and their psychological impact.The Beck Depression questionnaire composed of items relating to symptoms of depression such as Hopelessness and irritability, Cognitions such as guilt or feelings of being punished, Physical symptoms such as fatigue, weight loss, and lack of interest in sex. The BDIis a self-assessment of

depression severity with score 16 and above indicating significant symptoms .The HADS questionnaire includes questions on topics like Fright Restlessness, Nervousness. It is a 14 item self-report instrument with anxiety and depression as sub scales. The same questionnaire was filled up by the fertile women of the same age group.

SCORING OF THE QUESTIONNAIRES

BECK DEPRESSION INVENTORY II

CLASSIFICATION	TOTAL SCORE
LOW	1-16
MODERATE	17-30
SIGNIFICANT	31 and above

HOSPITAL ANXIETY AND DEPRESSION SCALE

CLASSIFICATION	TOTAL SCORE
NON-ANXIETY CASE	0-7
BORDERLINE ANXIETY CASE	8-10
ANXIETY CASE	11 and above

RESULTS

The primary aim of this present study was to find the level of mental health in infertile women and to compare it with fertile women.The results showed that out of 50 infertile women around 34% of the infertile women have significant level of depression while 40% have moderate levels of depression and 26% have low level of depression, which was quite higher as compared to fertile women(93% low, 5% moderate, 2% significant). (table1). The levels of anxiety were quite higher in infertile women as compared to fertile women (44% anxiety, 28% borderline) (table II).

Table I: Beck depression inventory II analysis

N= 150	Low	Moderate	Significant
Infertile (n=50)	26%	40%	34%
Fertile (n=100)	93%	5%	2%

Table II: Hospital anxiety and depression scale

N= 150	Non anxiety	Borderline	Severe anxiety
Infertile (n=50)	28%	28%	44%
Fertile (n=100)	88%	5%	7%

Beck Depression Results

Low – 1-16
Moderate – 7- 30
Significant – 31 and above

HADS Results

Non-Anxiety – 0 - 7
Borderline – 8 -10
Anxiety – 11 and above
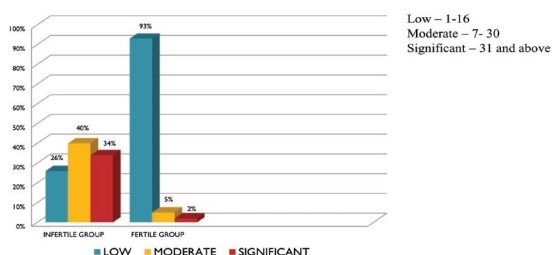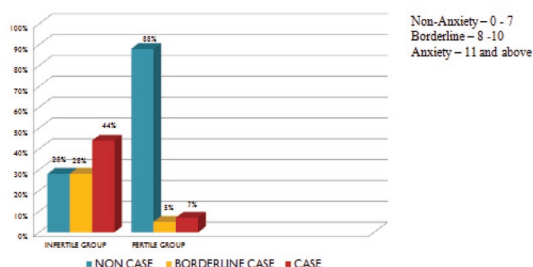
DISCUSSION

The major aim of the study is to find and compare mental health status of infertile and fertile women in Chennai area. According to World Health Organization (WHO), mental health is a state of a well-being, it is a state of psychological well-being in which one will achieve a synchronized integration of one's intellectual desires acceptable by society an appropriate balance between love.[1, 2] Work and leisure pursuits, in which the individual realizes his/her, own ability to cope up with the day to day stress of life.[1,2,3] Infertility is perceived as a problem across virtually all cultures and societies and affects an estimated 10%-15% of couples of reproductive age.[1-5] Consideration has been given to the association between psychiatric illness and infertility, researchers have also looked into the psychological impact of infertility and consideration has been given to the association between psychiatric illness and infertility. [6-8] Parenthood is one of the major transitions in adult life for both men and women; the stress of the non-fulfillment of a wish for a child has been associated with emotional sequelae such as anger, depression, anxiety, marital problems, sexual dysfunction, and social isolation. [3, 4, 5] The causal role of psychological disturbances in the development of infertility is still a matter of debate. The results of the present study are much in support with several other documented works. A study of 58 women from Lapane and colleagues reported a 2-fold increase in risk of infertility among women with a history of depressive symptoms; however, they were unable to control for other factors that may also influence fertility, including cigarette smoking, alcohol use, decreased libido and body mass index. Proposed mechanisms through which depression could directly affect infertility involve the physiology of the depressed state such as elevated prolactin levels, disruption of the hypothalamic-pituitary-adrenal axis, and thyroid dysfunction.[15] Couples experience stigma, sense of loss, and diminished self-esteem in the setting of their infertility. [8, 9] In general, among the infertile couple's women shows higher levels of distress than their male partners.[6, 12, 13] A number of studies have found that the incidence of depression in infertile couples presenting for infertility treatment is significantly higher than in fertile controls, with prevalence estimates of major depression in the range of 15%-54%. [3, 4, 7, 10, 11] Anxiety has also been shown to be significantly higher in infertile couples when compared to the general population, with 8%-28% of infertile couples reporting clinically significant anxiety.[10] Infertility is the biological inability of a person to contribute for the process of conception. Infertility is the problem of virtually all cultures and affects. In present study, psychological survey was done on 50 infertile women. The survey was in the form of a questionnaire-Beck Depression Inventory II and Hospital Anxiety and Depression Scale. The results showed that out of 50 infertile women around 34% of the infertile women have significant level of depression while 40% have moderate levels of depression and 26% have low level of depression, which was quite higher as compared to fertile women (93% low, 5% moderate, 2% significant). (Table I). The levels of anxiety were quite higher in infertile women as compared to fertile women (44% anxiety, 28% borderline) (table II). These findings indicate that infertile women got higher score than fertile ones. Therefore it is important to study such problems and to find the solutions for them.

LIMITATIONS

As the outcome was based on self-inventories, subject may be seen also the advantage is that minimal possibilities

of researcher bias are there to assess the outcome. It is necessary to utilize multi-dimensional factors and it needs extensive verification.

CONCLUSION

Childlessness and infertility are no longer private sorrows.Infertility places a great emotional burden on the infertile couple and their families. The quest for having a child becomes the driving force of the couple's relationship and hence is important to address the emotional needs of these patients.Primary focus must be psychotherapy or counseling and diagnosis of mental health difficulties in infertile women Therefore, establishing counseling centers to identify and treat severe and moderate depressed women thereby providing a social support.Future studies must be directed towards underlying mechanisms involved and the role of evidence based distress reduction in order to improve treatment results.

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The Study of Prevalence of Peripheral Arterial Disease in Type 2 Diabetes Mellitus

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ABSTRACT

Aim: To study the prevalence of peripheral arterial disease in type 2 diabetes mellitus.

Materials and Method: This study was conducted on 100 cases of type 2 diabetes mellitus inclusive of both sexes with age group above 40 years, from the outpatients of Department of Diabetology. Ankle brachial index involves measuring of systolic blood pressures in the ankles (dorsalispedis and posterior tibial arteries) and arms (brachial artery) using a 5-10MHz hand held Doppler and a blood pressure cuff, then calculating a ratio.

Results: The prevalence of peripheral arterial disease in the above study group based on ankle brachial index using hand held Doppler was 5%.

Keywords: Diabetes mellitus, Peripheral arterial disease, Hand Doppler, Ankle brachial index

INTRODUCTION

In India, the prevalence of diabetes is expected to increase from 31.7 million in 2000 to 79.4 million in 2030. In National Survey, 54.1% of diabetics developed it before the age of 50 years and they also had a higher risk of developing chronic complications of diabetes.[2]

Long term complications of diabetes are microvascular, macrovascular and neuropathic disease. Peripheral arterial disease (PAD) is characterized by atherosclerotic occlusive disease of the lower extremities. Even for the asymptomatic patient, peripheral arterial disease is a marker for systemic vascular disease involving coronary, cerebral and renal vessels, leading to an elevated risk of events such as myocardial infarction, stroke and death.[3]

Diabetics with peripheral arterial disease are known to be at high risk of foot complications like foot ulceration, infection and amputation.[6-8]

The risk of lower limb amputation is 15 to 46 times higher in diabetic patients than in normal persons.[10,11] According to some conservative estimates, the treatment costs of these complications account for approximately 25% of total hospital costs of diabetes care.[1]

MATERIALS & METHOD

This study was conducted on 100 cases of type 2 diabetes mellitus inclusive of both sexes with age group above 40 years, from the outpatients of Department of Diabetology, Govt. Kilpauk Medical College and Hospital.

Study design: Cross sectional study

Exclusion criteria

- Smokers
- Alcoholic
- Type I diabetics

Protocol:

The clinical evaluation including a thorough history, measurement of height, weight, blood pressure and detailed physical examination were done. A clinical vascular

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examination of foot and ankle brachial index measurement was done.

Noninvasive tests for peripheral arterial disease:

1) Pulse assessment

Pulse assessment of dorsalispedis and posterior tibial arteries were done.

2)Ankle brachial index (ABI):

Ankle brachial index (ABI)[3], which involves measuring the systolic blood pressures in the ankles (dorsalispedis and posterior tibial arteries) and arms (brachial artery) using a 5-10MHz hand held Doppler and a blood pressure cuff, then calculating a ratio.

Measurement of ankle brachial index [4]:

The patient was made to lie flat and the brachial systolic blood pressure was measured by locating the brachial pulse, and after applying ultrasound contact gel, the doppler probe was angled at 45 degrees and the probe was moved to obtain the best signal. The cuff was inflated until the signal is abolished then deflated slowly. The pressure was recorded at which the signal returns. The procedure was repeated for the other arm. The higher of the two values was used to calculate the ankle brachial index.

The ankle systolic pressure was measured around the ankle immediately above the malleoli. The dorsalispedis pulse was located, contact gel was applied. The pressure was recorded in the same way as for the brachial pressure. The procedure was repeated for the posterior tibial artery.

The highest reading obtained is used to calculate the ankle brachial index for that leg. The other leg is tested similarly. The ankle brachial index is calculated for each leg using the formula below.

$$ABI_l = P_l / P_a$$

ABI_l = ankle brachial index for a leg.

Pl = highest pressure obtained from the ankle vessels for that leg.

Pa = highest brachial pressure of the two arms.

The **diagnostic criteria[3]** for peripheral arterial disease based on the ankle brachial index are interpreted as follows:

0.91-1.30   -   Normal.

0.7. - 0.90   -   Mild obstruction.

0.40 - 0.69   -   Moderate obstruction.

<0.40   -   Severe obstruction.

>1.30   -   Poorly compressible artery at the ankle level due to the presence of medial arterial calcification.

Statistical software

Statistical analysis was performed with a SPSS programme version 16. Microsoft word and excel have been used to create tables, charts, graphs etc., 'p' value < 0.05 was considered as statistically significant.

RESULTS AND OBSERVATION

•   The prevalence of peripheral arterial disease in the above study group based on ankle brachial index using hand held Doppler was 5% (Table1).

Table 1: Test for Peripheral Arterial Disease

ANKLE BRACHIAL INDEX (ABI) USING DOPPLER IN TYPE 2 DIABETES MELLITUS.

ANKLE BRACHIAL INDEX	PERCENT (%)	N
>0.9 (NORMAL)	95	100
<0.9 (PAD)	5	

•   Mean age of patients with peripheral arterial disease was 65.2 years and without peripheral arterial disease was 54.73 years.

•   The mean age at diagnosis of diabetes mellitus inperipheral arterial disease patients was 45.20 years when compared to 47.02 years in those without peripheral arterial disease.

•   The prevalence of peripheral arterial disease is increased in patients with disease duration more 10 years (8.88%) when compared with those with disease duration less than 10 years (1.81%) (Table 2).

Table 2: Correlation between DM duration & pad

DURATION OF DM	PAD(%)
<10 years (n=55)	1.81
>10 years (n=45)	8.88

- The prevalence of peripheral arterial disease in hypertensive diabetics is 12.5% (Table-3).

Table 3: Prevalence of pad in hypertensive diabetics.

	DM WITH HT(n=16)		p VALUE
	PRESENT (%)	ABSENT (%)	
PAD	12.5	87.5	0.183

- In diabetics with peripheral arterial disease, 80 % had vascular symptoms and 20% were without symptoms.

DISCUSSION

The prevalence of peripheral arterial disease among type 2 diabetics was 5% .

Gopalpremalatha, Jerome Markowitz, et al.,[5] in 2000, studied the prevalence and risk factors of peripheral vascular disease among South Indians. The overall prevalence of peripheral arterial disease in the whole population was 3.2% and it was 6.3% in diabetic population.

Abnormal ankle-brachial index were more common in long- standing diabetes. Of patients with diabetes for more than 10yrs duration, peripheral arterial disease were seen in 8.88% respectively.

Fatma Al-Maskari and Mohammed El-Sadig et al.,[1] have shown that the main risk factors for peripheral arterial disease are increased disease duration (10–12 years), & type 2 diabetes mellitus. Jeuli et al.,[9] found, longer duration of diabetes mellituswas associated with peripheral arterial disease.

In our study, 80% of peripheral arterial disease patients had symptoms of vasculopathy and 20% were asymptomatic. This is supported by the Dolan NC, Liu K, et al[9].

In our study prevalence of peripheral arterial disease increased with age. RP Agarwal, M Ranka et al., in 2004, and Jeuli et al., in 2005 have also shown increased prevalence of peripheral arterial disease with advancing age.

From this study, it was found that there was no association between genders, peripheral arterial disease. Jeuli et al., found female gender to be associated with peripheral arterial disease.

There was no statistically significant correlation between hypertension and peripheral neuropathy and peripheral arterial disease in diabetics. Jeuli et al., found hypertension to be independently associated with peripheral arterial disease in diabetics.

Our results clearly demonstrate that diabetes mellitus eventually lead to chronic complications like peripheral arterial disease.

CONCLUSION

Advancing age, early onset of diabetes mellitus and duration of diabetes mellitus were directly related with development of peripheral arterial disease and asymptomatic patients also have peripheral arterial disease.

From the analysis we could conclude that Type 2 diabetes mellitus patients have significant peripheral arterial disease. It increases with both age and duration of diabetes.

An increased awareness of the prevalence of peripheral arterial disease, especially in older patients, should result in improved screening programmes in order to reduce the incidence of diabetic foot ulceration.

Also our study indicates that asymptomatic cases do occur and hence periodic screening for long term complications is advocated in diabetics.

Hence it is concluded that the screening tests for complications at the time of diagnosis of diabetes and periodic screening becomes imperative not only for early detection, but also to prevent progression to end stage diseases. Large well designed observational as well as interventional studies are further needed to substantiate the present findings.

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Association of Waist Circumference with Pulmonary Function in Obesity

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ABSTRACT

Obesity is a global health hazard and the prevalence of obesity is increasing. There is evidence that obesity, particularly abdominal obesity is negatively associated with pulmonary function. Obesity-related health risks are better explained by waist circumference (WC) than BMI as it provides information on fat distribution that cannot be obtained from BMI. We aimed to evaluate the association of WC with pulmonary function in adults with or without obesity. Pulmonary function was assessed by spirometry in 40 non-obese and obese adults between 20-60 years. Their height, weight and waist circumference were recorded. Student's t-test was done and Pearson's correlation was used to show a relationship between WC and the spirometric variables. Significant differences were observed in forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), expiratory reserve volume (ERV), inspiratory reserve volume (IRV) and maximum voluntary ventilation (MVV) between the obese and non-obese groups. WC showed a significant negative association with FEV1, FVC, ERV and MVV. The mechanisms underlying this association need to be further explored.

Keywords: Obesity, body mass index, waist circumference, pulmonary function.

INTRODUCTION

Obesity is a global health hazard associated with increased risk of atherosclerosis, diabetes, hypertension[1,2] and vascular dysfunction.[3, 4] Industrialization and urbanization have made obesity a major health problem in the developing countries. A recent study in the noted medical journal Lancet lists India in the third position among top ten countries having the highest number of obese people. The World Health Organization (WHO) defines obesity as having a body mass index (BMI) that is greater than or equal to 30 Kg/m^2. [5]

Weight and BMI are measures of overall adiposity. Numerous studies have examined the association between BMI or weight and pulmonary function.[6-8] But body weight and BMI provide no information on the nature of body fat distribution. Recent studies have implicated that reduction in lung function may be related to the distribution of body fat. [9-11] Pattern of obesity is an important predictor for diabetes, hypertension, hyperlipidemia and coronary events. [12] A central pattern of fat distribution or abdominal obesity is associated with greater health risk than lower body obesity.[13] Numerous epidemiological studies have shown

that abdominal adiposity is a risk factor for deterioration of pulmonary function. [9, 10, 14, 15] Waist circumference (WC), one of the indicators of abdominal adiposity has a similar relationship with pulmonary function.[15] Thus, the purpose of this study was to evaluate the association of WC with pulmonary function in adults with or without obesity.

MATERIALS & METHOD

This study was conducted on 40 healthy subjects between 20-60 years. Subjects with pre-existing respiratory diseases, hypertension, ishaemic heart disease and history of smoking as well as those unable to perform the tests adequately were excluded from the study. Written informed consent was obtained from all participants and the study was approved by the Institutional Ethics Committee.

Anthropometric Measurements: Weight was measured without shoes and with light clothing to the nearest 0.1 Kg using a standardized digital weighing machine. The height was measured (in cm) by using a fixed tape measure while subjects stood wearing no shoes, on a hard surface. WC was measured (in cm) horizontally through the narrowest part of the torso, between the

lowest rib and the iliac crest. [15] BMI was calculated using Quetlet's index (body weight in Kg/ height in m[2]). [16]The subjects were categorized into obese and non-obese groups according to BMI ranges as per WHO classification system. [17] Each group consisted of 20 subjects.

The evaluation of pulmonary function was done in the department of Physiology, Gauhati Medical College, Guwahati, Assam by digital spirometer model-RMS Helios 401 in accordance with the standards of the American Thoracic Society (ATS) and the European Respiratory Society (ERS) (2005). [18] The subjects were asked to avoid beverages like tea, coffee and other stimulants and report to the department after a light breakfast. They were briefed and familiarized with the procedure by demonstration of the required tests. Pulmonary function was evaluated through the procedures of Slow Vital Capacity (SVC), Forced Vital Capacity (FVC) and Maximal Voluntary ventilation (MVV) performed in this order in the sitting position at least 3 times each. The best of the three acceptable results were selected.

Statistical analysis was done by using student's unpaired 't' test. P value was taken as significant at 5 percent confidence level ($p < 0.05$). Pearson's correlation coefficient was used to show a relationship between WC and the spirometric variables.

RESULT

Table 1 shows the age, BMI, WC and spirometric variables of obese and non-obese groups with their p values. The obese group showed a significantly higher BMI and WC than the non-obese group. The FEV1, FVC, ERV and the MVV were all significantly lower and IRV was higher in the obese group. Pearson's correlation coefficient showed a significant negative correlation of WC with FEV1($r = -0.3274$, $p = 0.0392$), FVC ($r = -0.3199$, $p = 0.0442$), ERV ($r = -0.6023$, $p < 0.0001$) and MVV ($r = -0.3131$, $p = 0.0491$) while WC was positively associated with IRV ($r = 0.4271$, $p = 0.0060$) as depicted in figures 1,2,3,4 & 5.

Table 1:- : Showing mean with standard deviation of different parameters in the non-obese and obese group. NS = Not significant.

Parameters		Non-obese n = 20	Obese n = 20	P value
1.	Age (in years)	36.85 ± 8.171	39.750 ± 7.893	NS.
2.	BMI (in Kg)	22.746 ± 2.471	31.754 ± 2.525	<0.0001, Significant.
3.	WC (in cm)	80.850 ± 5.726	100.98 ± 5.200	<0.0001, Significant.
4.	FEV1 (in Ltrs)	2.393 ± 0.4001	2.044 ± 0.2830	<0.01, Significant.
5.	FVC (in Ltrs)	2.677 ± 0.4378	2.203 ± 0.3486	<0.001, Significant.
6.	FEV1/FVC	89.977 ± 6.719	93.124 ± 5.557	NS.
7.	VC (in Ltrs)	3.455 ± 0.8297	3.342 ± 0.7462	NS
8.	VT (in Ltrs)	0.7700 ± 0.4620	0.6865 ± 0.3096	NS
9.	ERV (in Ltrs)	0.8185 ± .4762	0.3295 ± 0.274	<0.001, Significant.
10.	IRV (in Ltrs)	1.289 ± 0.3864	1.601 ± 0.3983	<0.05, Significant.
11.	MVV (in Ltrs/min)	94.75 ± 21.648	79.6 ± 13.766	<0.05, Significant.
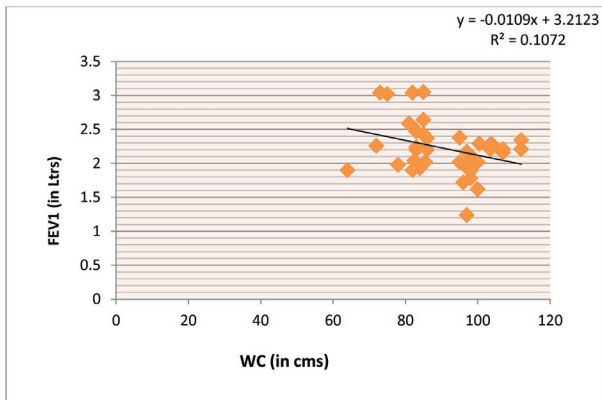
Figure 1:- Showing relation of WC with FEV1.
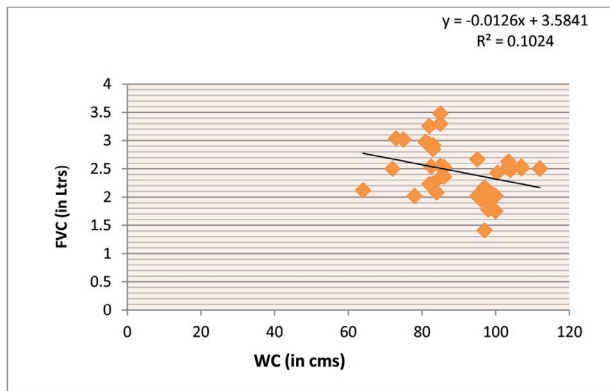
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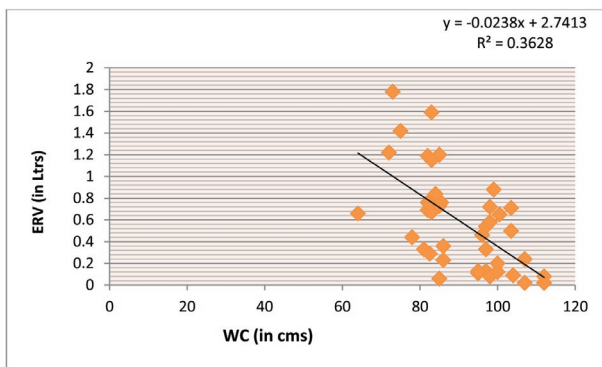
Figure 3:- Showing relation of WC with ERV.
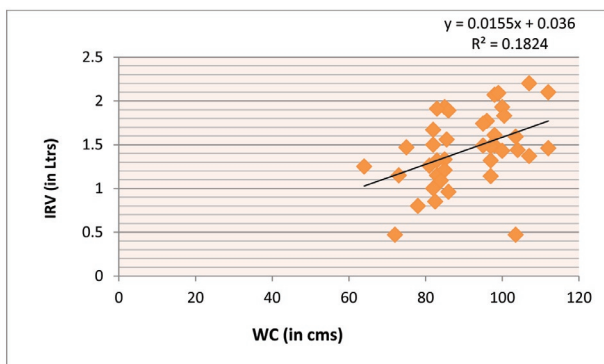
Figure 4:- Showing relation of WC with IRV.
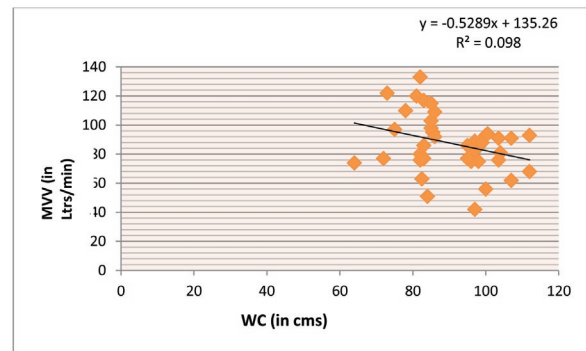
Figure 5:- Showing relation of WC with MVV.

DISCUSSION

Obesity can cause deleterious effects on respiratory function and impair health and quality of life of an individual. The risks related to obesity is not only associated to the magnitude of obesity but also to the presence of abdominal fat. [19] Industrialization and urbanization together with a sedentary lifestyle and low physical activity have led to weight gain and obesity, particularly central obesity. This is becoming increasingly apparent even in developing countries. Central or abdominal obesity is due to accumulation of fat inside the peritoneal cavity, packed between the internal organs. [20] Several studies have shown that BMI gives a measure of the total body fat while waist measurement gives an estimate of the abdominal/ visceral fat and its possible role as one of the risk factors for several obesity-related diseases. [13, 21, 22]

Literature reveals that the spirometric variables FEV1 and FVC tend to decrease with increasing BMI. [23-25] Several authors have even shown a negative association between abdominal obesity and pulmonary function. [10, 15, 26] In our study, significant differences were observed between the obese and non-obese groups for FEV1 and FVC. Moreover, there was significant negative association between the WC and these variables. However, no significant difference was observed in the FEV1/FVC ratio. This ratio was found to be usually well preserved [23-25, 27, 28] or increased even in morbid obesity. [29] This implies that the major effect of obesity is on lung volumes with no direct effect on airway obstruction.

We found a significant decrease in the ERV in obese individuals which is consistent with the findings of some other studies [30-32] A significant increase in the IRV in the obese group in our study was also evident in other studies [30, 31, 33] These authors suggested that the increase in IRV is due to overload on accessory respiratory muscles caused by the

obesity which serves to compensate for the decreased ERV thus keeping the VC unchanged. No significant differences were observed in the VC and VT values between the 2 groups in our study.

Abdominal obesity influences pulmonary function through a mechanism that is distinct from that of overall adiposity. [10] Abdominal obesity may restrict the descent of the diaphragm and limit lung expansion compared to overall adiposity which may compress the chest wall. [29] Abdominal obesity is likely to reduce ERV via compressing the lungs and diaphragm. [30, 32] ERV is related to fat mass and degree of obesity [29] and ERV improves after fat mass loss. [34] Our results showed a negative association of WC with ERV and a positive association with IRV. The changes in lung function evidenced in our result are probably caused by extra adipose tissue in the chest wall and abdominal cavity compressing the thoracic cage, diaphragm and lungs. The consequences are a decrease in diaphragm displacement, a decrease in lung and chest wall compliance and an increase in elastic recoil, resulting in a decrease in lung volumes and an overload of inspiratory muscles [30] leading to an increase in IRV.

The MVV was also found to be significantly reduced in our study as in previous studies. [31, 32, 35-38] Ladosky et al [31] reported a decrease in the ERV and the MVV in the obese. They were of the opinion that air trapping due to obesity caused a reduction of the ERV leading to a consequent reduction in the MVV. They suggested the reduced MVV in obesity is due to mechanical injury to the respiratory muscles caused by the excessive weight on the thorax. Some authors are of the opinion that because of the air trapping, inspiratory muscles are placed at a mechanical disadvantage leading to lower inspiratory pressure and flow, and reduced respiratory muscle strength, causing low MVV. [36-38] The reduced MVV and the negative association between WC and MVV in our study probably reflect the extrinsic mechanical compression on the lung and the thorax by the excess abdominal fat.

A strength of this study is that only non-smokers were included. Previous or current smoking is one of the most important confounders affecting lung function. To eliminate any influence of smoking, subjects with even a minimal history of smoking were excluded. There were some limitations to our study. Our study sample was small. Our findings could not be generalized to children or young adults. A similar study in these age groups would be of interest to examine the adverse effects of childhood obesity. Moreover, the cross-sectional nature of the study is also a limitation as it does not explore a cause-and-effect relationship between waist circumference and decreased lung function. Longitudinal studies are needed to investigate how abdominal adiposity influence pulmonary function. A follow-up study, after weight reduction of each individual in the obese group with decrease in their waist circumference, may help to confirm the causal relationship between waist circumference and pulmonary function.

CONCLUSION

Our study showed that obesity caused a reduction in the pulmonary function parameters which is directly related to abdominal obesity as waist circumference, a marker of abdominal obesity, is inversely associated with lung function. This study is an attempt to highlight the deleterious effect of increasing BMI and WC on pulmonary function so that appropriate interventional measures can be instituted to eradicate obesity and obesity related diseases.

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Effect of Kriya Yoga on Certain Cardio-Respiratory Variables

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ABSTRACT

Objectives: Aim of the study was to evaluate the effects of kriya yoga practice on certain cardiorespiratory variables in healthy individuals. **Background:** Improving the quality of life of healthy individuals, by increasing the cardio respiratory efficiency with kriya yoga practice/ Materials and methods: 20 healthy individuals who are practicing kriya yoga for a minimum of one year duration participated in the study. The study was conducted at Dyanamandali (kriya Yoga centre) Thanjavur. Blood pressure was recorded using sphygmomanometer in sitting posture pulse rate and percentage of oxygen saturation were taken using pulse oximeter. (Model No. MD 300 C$_2$ Beijing choice electronic Tech/.Co.Ltd). These readings were taken in the study group before and after kriya yoga. Paired t Test was performed to find out any significant difference between the data collected before and after kriya practice. **Results:** A significant decrement was noted in pulse rate (P<0.05) and blood pressure systolic (P<0.05), diastolic (P<0.05) after Kriya Yoga practice. Surprisingly oxygen saturation percentage was significantly increased (P<0.05) after Yoga **Conclusion:** Kriya Yoga practice is beneficial for cardiovascular improvements in Individuals if it is regularly practiced Apart from that, the study is limited with a small number of subjects, without any control group which remains to be studied. The practice of Kriya Yoga may probably shift autonomic equilibrium towards parasympathetic dominance. This physiological change could be a suitable clinical application for individuals with cardio respiratory disease.

Keywords: *Kriya Yoga, pulse rate, blood pressure, oxygen saturation.*

INTRODUCTION

According to WHO[1], "World Health Organization", Good Health is certainly more than just absence of disease. It reflects mental, physical, social and spiritual state of an individual and his or her general wellbeing. The mental component is the backbone of total health and wellbeing. Yoga is the complete union with Divine and manifestation of Divine qualities in human life. That means Yoga is the evolution of human consciousness into divine consciousness. Swami Vivekananda says "Yoga is a means of compressing one's evolution into a single life or even a shorter time than that". [2]

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The Kriya Yoga technique given by our Yogis is the greatest form of pranayama, through its practice the heart becomes quiet, the energy is switched off from the five senses and the mind attains the state of pratyahara[3]

Yoga involves adopting certain simple to complex body postures (asanas) and maintaining the same for set periods of time, Controlled breathing, voluntary concentration of thoughts (meditation) and repeated recital of phrases called mantras.[4]

Yoga practice can control risk factors for cardiovascular diseases like hypertension, type-II diabetes and insulin resistance, obesity, lipid profile and psychosocial stress. It also retard or early and advanced atherosclerosis.[5]

Ashok etal in his study showed that consistent practice of yoga postures and pranavama increases the lungs air flow, air capacity, stamina and efficiency. Back bending postures open the chest improving both lung and heart function. Yoga practice reduces stress, physical tension and

muscle tightness and increases overall feelings of wellbeing by activating the parasympathetic nervous system[6]

In view of the existing knowledge and yoga being a cost effective technique without side effects. It appears appropriatethat Kriya Yoga can be mandated for primary and secondary prevention of cardio vascular diseases like diabetes and hypertension

Hence the present study was taken to study the effect of yoga on cornmon cardio-respiratory parameters like pulse rate. Blood pressure and oxygen saturation percentage. These parameters were compared before and after Yoga practice.

MATERIALS & METHOD

The present study was conducted at Kriya yoga centre (Dyanamandali) Thanjavur. 20 healthy subjects of both genders who are practicing Kriya Yoga for a period of one year duration with an age group of 30 – 50 years were selected for the study. The study was undertaken to analyze the difference in certain cardio-respiratory parameters before and after Kriya Yoga practice. Individuals with diabetes hypertension, bronchial asthma were excluded. Persons who are alcoholic, smoker and history of drug intake were also excluded from the study. Informed written consent from the study group was obtained. Parameters such as age, sex, weight in kilogram, height in centimeters were measured for this study, proper history was taken, and cardio vascular and respiratory system were examined. Pulse rate, oxygen saturation percentage and blood pressure were recorded for Yoga practitioner before and after Kriya practice.

The study group selected, practice Yoga regularly, half an hour in the morning and in the evening. Kriya Yoga practice includes prayer, breathing exercise followed by meditation. The total duration is half an hour. They are practicing Kriya for more than a year. They used to practice Kriya with a sitting posture with spine erect, calm environment to attain a good response.

Pulse oximeter (model No. MD 300 c_2 Beijing choice electronic Tech.co.Ltd) is a small device that clips to the body typically a finger. The readings like pulse rate per minute and percentage of oxygen saturation were recorded for the study group in the left index finger. The blood pressure was recorded using sphygmomanometer with the subjects in sitting posture. Paired 't' test was performed to find out any significant difference between the data collected before and after Kriya practice.

RESULTS

Significant decrement were noted in pulse rate, systolic and diastolic blood pressure. The mean pulse value becomes 76.35 +/- 9.816 after Kriya when compared to 83.80 +/- 9.065   (beats per mminute) before Kriya ($P<0.05$). The mean systolic blood pressure value becomes 126.30 +/- 9.63/mmHg compared to 136.30 +/- 8.517 mmHg before Kriya ($P<0.05$). Similarly the mean diastolic blood pressure value, after Kriya becomes 80.80 +/- 4.021 mmHg when compared to 86.30 +/- 3.629 mm Hg before Kriya. ($P<0.05$). Surprisingly the percentage of oxygen saturation after Kriya value becomes 98.70 +/- 0.571% when compared to before Kriya 97.90 +/- 1.165% ($P<0.05$) percentage of oxygen saturation increases significantly after Kriya Yoga practice.

Table -1: Effect of Kriya Yoga on Certain Cardio-respiratory Variables

Parameters	Before Yoga	After Yoga	P- Value
Pulse	83.8 ± 9.06	76.35 ± 9.8	< 0.05
Systolic BP	136.3 ± 8.5	126.3 ± 9.6	< 0.05
Diastolic BP	86.3 ± 3.6	80.8 ± 4.0	< 0.05
Oxygen saturation percentage	97.9 ± 1.2	98.7 ± 0.6	< 0.05

DISCUSSION

Yoga is a system of physical and mental discipline. By practicing regular Yogic asanas, it is possible for the human body to become a finely tuned instrument with better capacity for development of mind and consciousness Kriya Yoga practice proves that Yoga training has produced a shift of autonomic equilibrium towards parasympathetic dominance. This is in consistent with shavasana training on cardiovascular response by Priyaetal.[7]

[8]Healther mason et al, in his study proved baronre flex sensitivity, improves oxygen saturation, lowers blood pressure and reduces anxiety. Slow breathing is often paired with contraction of glottis muscles (ujjavi) techninuqe in Yoga. The maximal increase in cardiovagal baro reflex sensitivity and decrease in blood pressue were found in slow breathing with equal inspiration and expiration. This corresponded with a significant improvement in oxygen saturation without increase in heart rate and ventilation. This is in accordance with our study showing decrease in pulse rate, systolic and diastolic blood pressure and increase in oxygen saturation % in post Kriya practice.

[9]India Devasena et al in his study showed significant decrease heart rate in subjects practicing Yoga. The systolic pressure is reduced in a highly significant manner and the diastolic pressure is reduced in a significant manner. This is similar, to our study of Kriya Yoga practice. The decrease in both systolic and diastolic blood pressure is significant. Ramkumar Thiyagarajan[10] et al in his study proved that significant reduction in the BP due to the effect of Yoga and standard life style modification in prehypertensives. He also proved that the reduction in systolic BP was significantly more in life style modification along with Yoga group as compared with only life style modification group. Similar significant reduction in systolic BP was found after Kriya Yoga in our study. This proves the parasympathetic dominant effect of Yoga.

CONCLUSION

The findings of the present study suggest, the practice of Yoga will improve the quality of life. It will extend healthy productive years far beyond the accepted norms. There is a shift in the autonomic nervous equilibrium towards parasympathetic dominance. Thus Yoga will result in increasing energy levels throughout working period. The benefits of Yoga are numerous. People, who practice it live longer and healthier

Conflict of Interest – Nil

Funding – Self.

Ethical Clearance – Obtained (Institutional Ethical committee certificate was obtained)

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Changes in Body Temperature and Intestinal Antioxidant Enzymes in Healthy and Colitis Male Rats: Role of Garciniakola

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ABSTRACT

The status of body temperature and antioxidant/free radical balance can be used as an index of health, the presence and progression of disease conditions. Studies have shown that *Garcinia kola* (GK), an agricultural produce exhibits numerous health benefits. The present study investigated the effect of pretreatment with a crude extract of GK on Mean body temperature (MBT) and antioxidant enzymes in normal and colitis male rats induced by acute Acetic acid (AA) instillation. Twenty adult male albino rats weighing 120-150g were randomly divided into vehicle, GK, AA and GK+AA groups. Rats were treated respectively with distilled water and 150mg/kg of GK per day for three weeks. Acetic acid was induced through a single intra-colic instillation of 1ml/200g/BWT of 7% acetic acid. The result showed that GK- treatment did not lead to a statistical decrease in MBT when compared with vehicle, but there was a significant reduction in GK treated group when compared with AA and GK+AA groups respectively. Intestinal superoxide dismutase SOD and catalase of GK-treated rats were significantly elevated ($P<0.05$) when compared with vehicle, AA and GK+AA groups. GK treatment caused a significant reduction ($P<0.05$) in intestinal malondialdehyde when compared with vehicle, AA and GK+AA groups. Therefore, GK administration alleviated hyperthermia in acetic acid inducedcolitis and improved intestinal antioxidant enzymes in both healthy and colitis male rats.

Keyword(s): *BWT-Body weight, Garcinia kola (GK),Acetic Acid (AA), Superoxide dismutase*

INTRODUCTION

Homeostasis is the maintenance of steady internal environment [1,2]. The conditions of internal environment that must be kept constant are not limited to pH, gases, and metabolites such as glucose, urea, uric acid, creatinine, body temperature and antioxidant/free radical balance.

Body temperature reflects the amount of heat, a form of energy, produced by metabolic activities, environmental temperature and other factors. In fact, the core body temperature taken orally, vaginally or rectally is a component of vital signs undertaken when evaluating human health condition.[3]Antioxidants are important components of body defense designed to regulate the level of free radicals produced by metabolic processes.

Aberrations in thermoregulatory mechanisms and oxidant/antioxidant balance often characterize disease conditions. For example, in rheumatic fever, hyperthyroidism and ulcerative colitis, an inflammatory Bowel Disease (IBD) that affects the lining of the large intestine (colon) and rectum, there is loss of tissue function [4] hyperthermia [5] and oxidative stress [1,6,39,40].

Oxidative stress occurs when there is an imbalance between the level of antioxidant and reactive oxygen species (ROS) such as lipid peroxides, hydroxyl radicals, hydrogen peroxide and oxygen free radicals[4,7].

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Pro-inflammatory cytokines produced by tissue damage are known to play major role in the etiology of fever[4,38]. Studies have demonstrated that in ulcerative colitis, inflammatory lesions of gut mucosa and smooth muscle cells have accumulated granulocytes which tend to release many inflammatory mediators such as toxic oxygen metabolites, lysosomal enzymes and arachidionic metabolites [8]. For example, neutrophil is a granulocyte that secretes superoxide anion radicals, hydrogen peroxide and hydroxyl radicals which tend to accumulate within the inflammatory lesions and cause impairment of the cellular membrane and cell death [8].

Under normal conditions, enzymatic and dietary antioxidants ameliorate the levels of reactive oxygen species and relieve fever. Enzymatic and dietary antioxidants which include but are not limited to vitamins A, C and E, glutathione peroxidase, superoxide dismutase, catalase, drugs, food substances and plant extracts [9,10,35] have been shown to elevate antioxidant/free radical ratio by increasing intrinsic antioxidants or decreasing the body free radical level and optimizing cellular metabolic heat. Ketotifen, granisetron, and DA-6034 decreased myeloperoxidase, malondialdehyde, cyclooxygenase, and inducible nitric oxide synthetase[11,12]. In human and animal models of ulcerative colitis, cucumin and fat – free diets decrease inflammatory cytokines[13] and tissue damage [14].

Garcinia kola (bitter kola) is one of the two forms of kola, a major agricultural produce in Nigeria that accounts for over 90% of local consumption[37]. The crude extract of the kola has been reported to have some biological effects. For example, it ameliorated bronchitis and throat infections [15]. It decreased parasitic infection and [16]leucocyte infiltration [17] and increased antioxidants [10].

Crude extract and diets containing seeds of *Garcinia kola* inhibited neutrophil infiltration characterizing a model of experimental ulcerative colitis [18]. In another study, Kolaviron, a water extract of *Garcinia kola* and sulfasalazine mitigated dextran sulphate sodium-induced colitis by increasing antioxidant status and decreasing hydrogen peroxide and lipid peroxidation [19]. The effect of pretreatment with crude extract of *Garcinia kola* on mean body temperature and intestinal antioxidant enzyme in healthy and acetic acid induced colitis in male wistar rats remains poorly understood. Therefore, the aim of the present study is to investigate the effect of crude extract of *Garcinia kola* pretreatment on mean body temperature and intestinal antioxidants in healthy and acetic acid induced ulcerative colitis male rats.

SITE OF THE EXPERIMENT

The experiment was carried out at the animal house, Department of Physiology, Ladoke Akintola University Ogbomosho Oyo State, Nigeria.

ANIMAL CARE AND MANAGEMENT

Twenty adult male abino rats weighing 120-150g were used for the research work. They were divided into four groups consisting of five animals each. These rats were kept in five different cages with a wire mesh covering .They were provided with pelletized grower's mash and water adlibitum under 12 hour light and 12 hour darkness cycle.

EXPERIMENTAL PROCEDURE

The experiment was performed in accordance with "NIH guidelines for the care and use of laboratory animals". The rats were weighed and randomly grouped into;

Group A; received distilled water for three weeks and designated Vehicle-treated

Group B; received *Garcinia kola* extract for three weeks and designated *Garcinia kola*-treated(GK)

Group C; received distilled water for three weeks then acetic acid was infused and designated
Acetic acid(AA) or colitis group

Group D; received *Garcinia kola* for three weeks then acetic acid was administered and designated
Garcinia kola +Acetic acid (GK+AA) or pretreated colitis group

EXTRACTION OF GARCINIAKOLA

The *Garcinia kola* seeds were obtained commercially from the Oja Igbo in Ogbomosho. The outer coats were removed and the seeds cut into pieces and air dried. The dried seeds were ground to fine powder and methanolic extraction was done by a soxhlet extraction. The yield was concentrated to a semi-solid form. 3.0g of the extract was measured and dissolved in 3% ethanol to give 30mg/ml.

ADMINISTRATIONS

Distilled water and 150mg/kg of *Garcinia kola* extract was administered for three weeks once per day.

INDUCTION OF COLITIS

After fasting the animals for 24 hours, the animals were anesthetized with a light ether anesthesia, a flexible plastic catheter (outer diameter = 2mm) was inserted rectally into the colon (catheter was placed about 8cm proximal to the anus). Colitis was then induced by administering 1ml/200gBWT of 7% acetic acid.

MEASUREMENT   OF   MEAN   BODY TEMPERATURE (MBT)

The Mean Body Temperature is the average of three consecutive rectal temperature readings of rats in all groups using Mercury-in-glass thermometer.

ASSESSMENT OF MALONDIALDEHYDE

This was carried out using the method described by Varshney and Kale (1990)[20]

DETERMINATION OF SUPEROXIDE DISMUTASE (SOD)

SOD activity was determined by the method of Misra and Fridovich (1972) [21]

DETERMINATION OF CATALASE ACTIVITY

Catalase activity was done according to the method of Sinha , 1972 [22]

DATA PROCESSING

Data are expressed as mean ± standard error of mean and the significant difference was analyzed using unpaired T-test. Significant level was accepted at $P<0.05$.

RESULT

[a] significantly different ($P<0.05$) from GK.
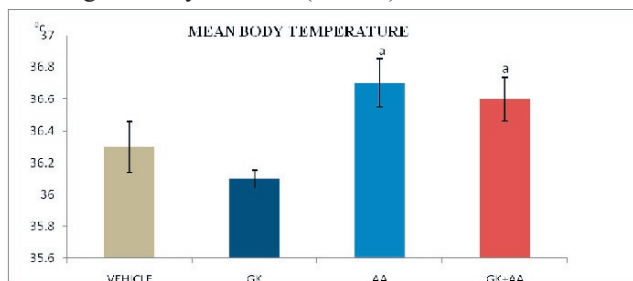
Figure 1: The effect of Garcinia kola **(GK)pretreatment on Mean Body Temperature (MBT).**

There was a significant decrease in MBT of GK group when compared with colitis (AA) and Pretreated colitis (GK+AA) groups respectively.

[a] significantly different ($P<0.05$) from GK.
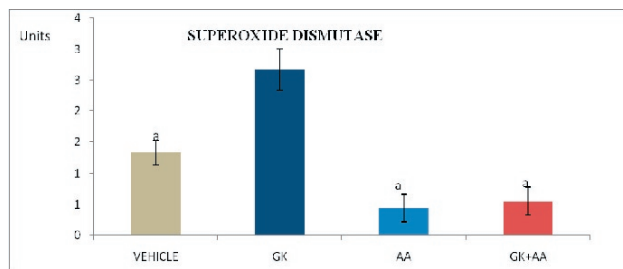
Figure 2: The effect of Garcinia kola **(GK)pretreatment on Superoxide dismutase (SOD).**

There was a significant increase in SOD of GK group when compared with vehicle, colitis (AA) and Pretreated colitis (GK+AA) groups respectively.

[a] significantly different ($P<0.05$) from GK.
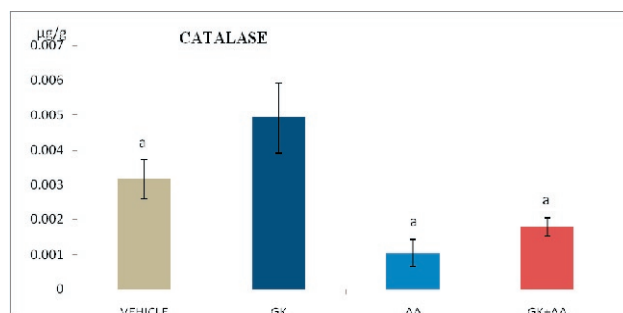
Figure 3: The effect of Garcinia kola **(GK)pretreatment on Catalase.**

There was a significant increase in catalase of GK group when compared with vehicle, colitis (AA) and Pretreated colitis (GK+AA) groups respectively.

[a] significantly different ($P<0.05$) from GK.
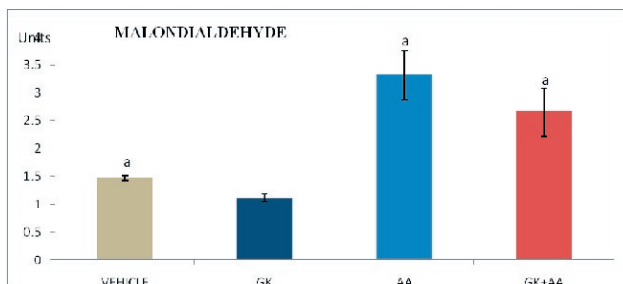
Figure 4: The effect of Garcinia kola (GK)**pretreatment on Malondialdehyde (MDA).**

There was a significant decrease in MDA of GK group when compared with vehicle, colitis (AA) and Pretreated colitis (GK+AA) groups respectively.

DISCUSSION AND CONCLUSION

Alterations in mean body temperature and antioxidant

capacity are associated with presence and progression of disease conditions [4,23,25,26,38]. Inflammatory Bowel Diseases such as cohn's disease and ulcerative colitis are characterized by impaired intestinal antioxidants and hyperthermia [5]. Hyperthermia occurs when heat production or absorption exceeds dissipation [25]. Although, the present study could not ascertain the reliability of hyperthermia as a major symptom characterizing acute experimental ulcerative colitis,[5,36] the statistical reduction in mean body temperature of Garcinia kola treated rats when respectively compared with colitis and pretreated colitis group showed that the crude extract from Garcinia kola reduces high mean body temperature associated with ulcerative colitis. This reduction may be attributed to the anti-inflammatory potency of the extract[26, 27, 28, 29,34].

Garcinia kola is a flavonoid rich agricultural produce [29]. Flavonoids are known to reduce the release of histamine, bradykinin and leukotriene that trigger increase in vascular permeability and escape of macromolecules from microcirculation This reductive effect results into reduction in size of edema, leucocyte infiltration, DNA damage in isolated colonocyte,[30] mucosa inducible Nitric oxide ,myeloperoxidase,mitogen activated protein kinase and cyclooxygenase,[14] a mediator of fever.

Despite the fact that low temperature is required for spermatogenesis[41] and other vital processes in the body, thecomparative advantage of the significant reduction in mean body temperature in Garcinia kola treated rats when respectively compared with pretreated colitis and colitis groupson colonic health and resistance to diseases is not well understood.

Malondialdehyde (MDA) is a reactive aldehyde and its production is used as a biomarker of oxidative stress [31]. The significant decrease in intestinal malondialdehyde level of Garcinia kola treated when respectively compared with vehicle, colitis and pretreated colitis groups is an indication of an increase in antioxidant production [4,19] and high antioxidant/free radical ratio evidenced by an increase in superoxide dismutase and catalase production. Superoxide dismutase (SOD) is an intrinsic antioxidant enzyme that catalyzes the conversion of reactive oxygen species (ROS) to less toxic hydrogen peroxide [32,33]. The present study showed a significant increase in intestinal superoxide dismutase of Garcinia kola treated group when respectively compared with vehicle, colitis and pretreated colitis groups. Catalase acts on hydrogen peroxide and convert it to non-toxic products, majorly water and oxygen

[33]. Garcinia kola significantly elevates intestinal catalase level when compared respectively with vehicle, colitis and pretreated colitis groups. Increase in tissue catalase level has been reported with flavonoids rich substances which includes bitter kola[19,27].

The Increases in superoxide dismutase and catalaseand decrease in malondialdehyde in Garcinia kola treated group when compared with other groups especially vehicle and pretreated groups might indicate conferment of protection on colonic tissue.[4,7,19].

In conclusion, the results of the study indicated that *Garcinia kola* administration alleviated hyperthermia in acetic acid induced colitis and improved intestinal antioxidantenzymes in both healthy and colitis male rats.

Clearance Certificate: At the time when this study was conducted, a five member ethical committee was constituted and a confidential approval letter was sent through the head of department to the chairman of Animal house ladoke Akintola University of Technology. No written approval was presented to us before but signatures were appended on the certification page of the report of this work by the head of department and an assigned supervisor.

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Effects of Occupational Dust Exposure on the Ventilatory Functions among Cement Factory Workers: A Cross Sectional Study in Barak Velly Cement Limited, Assam

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ABSTRACT

The present study is undertaken to find the effects of cement dust exposure on ventilatory functions among cement factory workers in the Barak valley district of Assam. Barak valley Cement Limited Started manufacturing Portland Cement since 1999. The Cement factory is situated at Badarpurghat 25Km from Silchar Town. They produce (43 and 53) grade Portland pozzlona Cement. Pulmonary Function Tests were carried out among 60 cement factory workers with more than 10 years duration of exposure to cement dust and 60 un-exposed subjects chosen from staffs of Silchar Medical college and Hospital,Silchar. The FVC (2.13 ± 0.98L compare to 3.31 ± 0.76L ; P-value <0.00001) and FEV_1(1.91 ± 0.89L compare to 2.86 ± 0.76L; P-value<0.00001 were significantly lower in cement factory workers than control subjects. The $FEV_1\%$(91.24 ± 14.27 compare to 85.99 ± 13.82; P-value 0.0201 showed little difference.However PEFR (5.33 ± 2.23 compare to5.34 ± 2.54 showed no significant difference.These findings suggest that chronic exposure to cement dust can decline ventilatory functions.So, far as protective gears were available but finding suggest poor compliance. However, cement factory management should focus attention on health education and introduce effective gadgets and enforce their usage.

Keywords: *Portland cement,Pulmonary Function Test,Cement dust.*

INTRODUCTION

Occupational exposure to cement dust is likely to vary in different productions operation and process[1,2].

Several clinical and epidemiological studies have shown an increase incidence of impairment of respiration and prevalence of respiratory symptoms among cement production workers[1, 5,6.] Portland cement dust is considered to have little potential to induce adverse effects on the lung such as pneumoconiosis or fibrosis[7,8].

However, in a study author showed a significant relationship between cumulative cement dust exposure

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and reduction of FVC and FEV_1 in production workers in Tanzania[9,16.]

Furthermore, the association between developing chronic obstructive pulmonary disease (COPD) and exposure to cement dust for more than 10 years at 10mg/m³ is well documented[3,4,9.]

Cement production is a dusty operation resulting exposure of factory workers to cement dust. The protective gears should be worn but report indicate that industries rarely provide safety measure[12,13] .The resulting exposure to dust effect respiration and prevalence of respiratory symptoms amongst workers[11,12,15]. The severity of impairment of respiratory function has been shown to depend on years of exposure [11].

The parameters is used to assess ventilatory function in this studies include FVC(Forced vital capacity),FEV_1(Forced expiratory volume in 1 second), $FEV_{1\%}$ (Forced expiratory volume in 1 second as a percentage of forced vital capacity), PEFR(Peak expiratory

flow rate)[11,12,15].

The main objective of this cross-sectional study was to assess the relationship between occupational exposure to Portland cement dust and pulmonary function impairment in this region of Barak valley district of Assam. So far as we could not find any reference of previous study in this region,so I would like to carry out this study.

RESEARCH ELABORATIONS

This is a cross sectional study conducted both cement factory and Department of Physiology,Silchar Medical College,Ghungoor,Silchar. An Approval was obtained from the institutional ethical committee. The study population are those who are the workers of cement factory engaged in cranes, packing, crushing and mill sections. The workers in these section were chosen due to high level of exposure[11,16]. 60 workers of these sections were selected for present study. They were exposed to cement dust more than 10 years duration. An un-exposed group 60 were working and residing 15 km away from cement factory in Ghungoor, Silchar.Subjects belong to non-smokers and no history of respiratory illness like cough,bronchitis,bronchial asthma were selected both exposed and unexposed group. Data were collected by structured questionnaire, to determine socio-economic status, years of exposure, date of employment, workplace, safty gadgets and information on general health, history of past illness and habits of smoking and alcohol consumption.

The heights (cm) of subjects were measure without shoes, by using stadiometer. Weight (kg) was measured with minimum clothes and without shoes, by standard weighing machine. Pulmonary function test were carried out in morning between 9am to 11am after a light breakfast by computerized spirometer in the department of physiology, Silchar Medical College, Silchar.The procedure explained to the subject and tests were carried out.

FVC (Forced vital capacity), FEV1 (Forced expiratory volume in 1 second), FEV1 %(Forced expiratory volume in 1 second as a percentage of forced vital capacity), PEFR (peak expiratory flow rate) were measured by computerized spirometer. The tests were recorded in standing position with nose clips and lips applied firmly around the disposal mouthpiece. The subject inspired maximally and then expired forcefully and rapidly as possible through mouthpiece of spirometer and nose clip should be applied to close nostrils during expiration. Three attempts were made and best of three values was selected[10,

[12]. The anthropometric parameters such as age, sex, height, weight and ethnicity affects on lung function [17, 18, 19].

Results are expressed as Mean ± SD. Statistical analysis was carried out using one tailed hypothesis of Z-test.

FINDINGS

Table-1. Showes summary of the anthropometric parametric parameters of both exposed and unexposed subjects. Anthropometric parameters of both exposed and unexposed group was similar except in their heights.The exposed group was significantly more height than unexposed group (P-value 0.0359).

Table-1. Shows Demographic parameters of workers exposed and unexposed groups

NS=Not Significant

Parameters	Exposed Mean±SD	Unexposed Mean±SD	P-value
Age(years)	36.21±10.05	37.48±9.26	NS
Height(cm)	164.68±9.69	161.86±7.28	0.0359
Weight(Kg)	58.05±10.89	56.73±12.80	NS
BMI(Kg/m²)	21.15±3.40	21.03±3.73	NS
N	60	60	

Table-2. Shows Ventilatory parameters of Exposed and Unexposed group

NS=Not significant; N= Number

Parameters	Exposed Mean±SD	Unexposed Mean±SD	P-value
FVC(L)	2.13±0.98	3.31±0.76	<0.00001
FEV_1(L)	1.91±0.89	2.86±0.76	<0.00001
FEV_1%	91.24±14.27	85.99±13.82	0.0201
PEFR(L)	5.33±2.23	5.34±2.54	NS
N	60	60	

Pulmonary function parameters are shown in the table-2. These parameters are differ significantly between exposed and unexposed subjects, the FVC (P<0.00001), FEV_1 (P<0.00001) and FEV_1 % (P-value 0.0201) butPEFR did not differ significantly.

DISCUSSION

The main finding of the present study is that the pulmonary function parameters like FVC and FEV_1 were

significantly lower in workers group, exposed to cement dust compare to those unexposed group. This suggests that chronic cement dust exposure impairs lung function. It agrees with the finding of author[11] who first report Cement factory lung disease in Nigeria and those of others elsewhere[12, 15]. FEV_1%was significantly lower in unexposed subjects compare to exposed subjects and PEFR did not differ significantly in exposed group compare to unexposed.

The observed detorioation of ventilator function may be due to ineffectiveness of protective gears.

The finding of present study suggests that occupational exposure to cement dust has harmful effect on the lungs. The exact mechanism is not known. So, it is yet to be determined, effects are directly due to exposure to cement dust or mediated by metabolic product of cement dust. The component of cement dust show irritating, sensitizing and pnemoconiotic properties[14]. Animal studies reveal that cement dust induces atrophic and hypertrophic changes in the nasal and pharyngeal mucosa as well as chronic exfoliative bronchitis[14]. Post mortem examination of lungs of experimental animals exposed to cement dust reveled slight tissue fibrosis and emphysema foci[14].Also finding suggest that cement dust exposure may decrease lung and thoracic compliance by impairing intercostals muscle performance[15].These effects of cement dust may account for the observed impairment of pulmonary function observed in this study.

In summary, the present findings show that the FVC, FEV_1 were significantly lower in works (exposed) group then control group(unexposed).However, PEFR of both groups are similar and P-value non-significant. These suggest that chronic exposure to cement dust impairs pulmonary function. Since protective gears were provided, declining of pulmonary function suggests that the protective gears were ineffective or the workers did not wear them. However, it is concluded that chronic exposure to cement dust has adverse effect on pulmonary function. It is recommended that to safeguard of health of the cement workers and their community, the cement factory management should enforced safety training in work environment and conduct health education and explain the hazards of exposure to cement dust and their safety and precautionary measures. There should be regular/ periodic monitoring of cement dust level in and around the environment and use of dust filters.

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Serum Calcium and Parathyroid Hormone levels in Premenopausal and Postmenopausal Women

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ABSTRACT

Aim: The study was carried out to assess serum calcium and parathyroid hormone levels in premenstrual and postmenopausal women.

Method: 40 well nourished postmenopausal women between the age group 40 -65 years were selected as study group and 40 well nourished premenopausal women between the age group 40-55 years were selected as control group. The study was carried out at Osmania General Hospital.The women selected for the study were healthy and had no previous history of Hypertension,diabetes,carcinomas or any other disease.

Serum Calcium was measured using (0 - CRESOLPHTHALEIN COMPLEXONE METHOD)

Parathyroid Hormone(PTH) levels were measured using enzyme linked immunosorbent assay.

Results: Statistical analysis was done using unpaired t test.Serum calcium levels were significantly lower in postmenopausal women than in pre-menopausal women, while Parathyroid hormone levels were significantly higher in postmenopausal women.

Conclusion: Postmenopausal women are calcium deficient and have increased bone turnover as indicated by Parathyroid hormone levels.

Keywords: Serum calcium, PTH

INTRODUCTION

Menopause, also known as the climacteric, is the time in most women's lives when menstrual periods stop permanently, and the woman is no longer able to have children[1]. Menopause is the time when a woman stops having menstrual periods[2]. Before menopause, a woman's periods typically become irregular, which means that periods may be longer or shorter in duration, or be lighter or heavier in terms of the amount of flow. During this time, women often experience hot flashes; these typically last from 30 seconds to ten minutes, and may be associated with shivering, sweating, vaginal dryness and reddening of the skin.[3]

At the physiological level, menopause happens because of a decrease in the ovaries' production of the hormones estrogen and progesterone[1]. The term "perimenopause", which literally means "around the menopause", refers to the menopause transition years, a span of time both before *and* after the date of the final episode of flow.

According to the North American Menopause Society, this transition can last for four to eight years[4]. No pain is usually associated with bone loss. However, bone loss can cause osteoporosis, a condition that increases the risk of bone fractures. These fractures can be intensely painful and can interfere with daily life. They also can increase the risk of death.

This architectural function of calcium ion is the dominant theme of our discussion, which is in dynamic equilibrium that must be maintained in various organs (GIT, kidney, bone, skin) so regulation of intracellular Ca^{++} is of great importance. The free Ca^{++} concentration in the cytoplasm is maintained at about 100 nmol/litre. The calcium ion concentration in the intestitial fluid is about 12,000 times the cytoplasmic concentration i.e., 1,200,000 nmol/Litre. Much of the intracellular Ca" is bound by the E.R and other organelle, which provide a store from which Ca can be mobilized in to the cytosol which can activate a number of protein kinases such as Trophonin, calmodulin and calbindin.

Parathyroid hormone (PTH), parathormone or par athyrin, is secreted by the chief cells of the parathyroid glands as a polypeptide containing 84 amino acids, yet effective hormone-receptor interaction requires solely the 34-N-terminal amino acids, PTH acts to increase the concentration of ionic calcium (Ca^{2+}) in the blood[5]. It enhances the release of calcium from the large reservoir contained in the bones[6].

MATERIALS AND METHOD

The study was carried out in Osmania General Hospital, Hyderabad.

Study Group: 40 well nourished postmenopausal women between the age group 40 - 65 years.

Control Group: 40 well nourished premenopausal women between the age group 40-55 years.

Inclusion criteria for study group:

1)Nonsmokers

2)Nonalcoholic

3)No History of diabetes, Hypertension

Inclusion criteria for control group:

1)Regular menstrual cycles

2)Nonsmokers

3)Nonalcoholic

4)No history of diabetes, hypertension

Exclusion criteria:

1)any systemic illness.

2)any acute illness.

3)On calcium supplementation.

A blood sample is taken by needle from a vein in the arm under aseptic conditions.

CALCIUM (KIT - METHOD)

(0-CRESOLPHTHALEIN COMPLEXONE METHOD)

PRINCIPLE: Calcium in alkaline medium reacts with O-cresolphein complexone to form a purple coloured complex whose absorbance is proportional to the calcium concentration. The interference due to magnesium and iron is eliminated by using 8 - hydroxyquinoline. REAGENTS PROVIDED:

1. Buffer solution

2. Colour reagent

3. Calcium standard 10 mg%.

PRECAUTIONS:

1. Use of plastic tubes for this assay

2. Contamination of glass ware with calcium, usually from detergent, is a problem of this assay. Therefore glassware should be washed with dilute hydrochloric acid (30% v/v) and rinsed with high purity deionized water before use.

3. Plasma collected in EDTA or citrate or oxalate as an anticoagulant should not be used.

4. Serum should be separated from the clot without delay

PTH levels were measured by Enzyme Linked Immunosorbent Assay.

Statistical Analysis:

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

P value <0.05 was considered as statistical significant.

The results were expressed as Mean ± Standard Deviation.

FINDINGS

Table.1: Comparison of Serum Calcium and PTH levels in study and control group.

Menopausal			Postmenopausal			
Investigations	Mean	S.D	Mean	S.D	t-value*	P-value
Serum Calcium	9.46	1.074	8.74	1.724	2.241	0.0278
PTH	49.64	9.038	60.18	11.181	4.636	0.001

*Unpaired t test

RESULTS

The mean of serum calcium was 9.46 ± 1.074 in premenopausal women and in postmenopausal women it was 8.74 + 1.724. Serum Calcium was significantly reduced in postmenopausal women compared to premenopausal women.

The mean of parathyroid hormone levels was 49.64 ± 9.038 in premenopausal women and in postmenopausal women it was 60.18 + 11.181. Parathyroid hormone levels were significantly increased in postmenopausal women compared to premenopausal women.

CONCLUSION

Postmenopausal women are calcium deficient and have increased bone turnover as indicated by increased serum parathyroid hormone levels.

DISCUSSION

The body of an young adult human contain about 1100 gms of calcium (27.5 moles) 99% of this calcium is in the skeleton as hydroxy apetite crystals and 1% is in soft tissues and is the E.C.F. About 1% of skeletal calcium is exchangeable with ECF. Total ECF contain 900 mg of calcium which is in dynamic equilibrium with other compartment. The concentration of calcium in the plasma is about 9-11 mg%[7]. The calcium in the plasma is present in three forms.

1.40% of calcium is combined with plasma protein which is non diffusible

2.10% of calcium which is complexed from with citrates and phosphates is diffusible

3.50% of calcium is ionized which is diffusible.

The ionic form of calcium is important for effective functions of the calcium in the body. The plasma ionic calcium level is tenaciously defended i.e., changes of as little as 1% in either direction are enough to mobilize homeostatic mechanism that function to restore the equilibrium concentration.

The skeleton of a 70 kg man contain about 1000 gm of calcium ions. The calcium of the bone is two types:

1. A readily exchangeable reservoir about 0.55 gm which is hormone modulated.

2. Much larger pool of stable calcium that is slowly exchangeable.

In steady state the amount of calcium ion is deposited in the bone, the same amount is resorbed from the bone. Obviously in a growing child Ca^{++} retention would occur in proportion to the bone growth. After the age of 30 to 40 years the bone mass decreases progressively so that there is a small constant net loss of Ca over a period of years.

The 3 main hormones involved in Ca++ homeostasis are[8] :

1. PTH

2. Calcitonin

3. 1,25 dihydroxy cholecalciferol

PTH acts to conserve body calcium and to increase extracellular fluid Ca^{++} concentration,it does so by promoting resorption of Ca^{++} from the bony skeleton, by retrieving of Ca^{++} from glomerular filtrate, and by increasing the rate of formation of 1,25 dihydroxy cholecalciferol in the kidney.

This 1.25 $(OH)_2$ D3 accelerate the rate of absorption of Ca from the gut. It plays permissive role in the action of PTH on bone and possibly on the kidney.

Calcitonin inhibits bone resorption. Other hormone which have direct on indirect effects on bone are G.H, somatomedin, thyroid hormone, oestrogen, androgen and insulin.

PARATHYROID HORMONE

Parathyroid hormone acts on bone to stimulate resorption PTH does not act on osteoclast in the absence of cells of osteoblastic lineage, more over PTH receptors are abundant on osteoblast, but not on osteoclast, PTH acts on osteoblast to cause cell contraction to induce immediate early response genes including C-fos and the inducible form of prostaglandin G and prostaglandin H synthetase and to increase the synthesis of local mediators including insulin like growth factor I (IGF-1) and IL-6[11]. High amounts of PTH increases the bone turnover[9]. These cytokines activate the osteoclasts so that they become powerfully phagocytic and attack the bone.

One third of the post-menopausal women with osteoporosis had elevated PTH levels[10]. In postmenopausal women bone turnover increases, this is believed to be due principally to a diminution of a direct action of estrogen on bone cells[11].In addition, decreased intestinal calcium absorption[12] and decreased renal calcium conservation[13]

after the onset of estrogen deficiency.

Estrogen and PTH do not just have opposite effects on bone; estrogen also prevents the PTH level from increasing too much. When estrogen level is at its lowest (around menstruation *and* after menopause), PTH level is at its highest. That is why hyperparathyroidism is common in postmenopausal women[14] and estrogen administration is an effective therapy.

It is concluded from this study that postmenopausal women are calcium deficient and have increased bone turnover as indicated by increased Parathyroid hormone levels.It is advised that postmenopausal women should take calcium supplementation, undergo regular checkups to detect any osteoporotic changes in bones and should be appropriately treated.

Conflict of Interest – Nil

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Spirometric Measures of Air Conditioned Drivers

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ABSTRACT

Background: Currently the trend is that, the drivers of private transport vehicles are travelling in an enclosed air conditioned atmosphere in order to avoid dust exposure. Previous studies conducted so far examined the lung function in drivers exposed to dust.

Objective: The present study was undertaken to see the pulmonary function test in drivers working in an enclosed air conditioned atmosphere with no exposure to dust.

Materials and method: The study group included 40 healthy male non smoking drivers (bus drivers) and 40 healthy male non drivers. Pulmonary functions were measured using computerised spirometer Easypro. Forced vital capacity (FVC), Forced expiratory volume in first second (FEV 1), FEV 1/ FVC ratio, Peak expiratory flow rate (PEFR), Forced expiratory flow at 25-75% of lung volume (FEF 25-75) were measured and compared between the two groups.

Result: There was statistically significant decrease in FEV1/FVC ratio ($p < 0.001$), and FEF 25-75 ($p < 0.001$) in drivers when compared to non drivers. Also FEV1 and PEF were decreased in drivers when compared to normals though it was not statistically significant.

Conclusion: The findings suggest that exposure to air conditioner atmosphere in private transport vehicles even though reduces the exposure to dust, is still a risk factor for the development of respiratory dysfunction and impaired lung functions.

Keywords: **Pulmonary function test, air conditioner, drivers.**

INTRODUCTION

Transport workers like drivers have been subjected to various health hazards from their exposure to environmental pollution. The present day development of our country has led to the improvised transportation facilities reducing their risk of exposure to dust particles. However, modernisation of transport facilities still imposes development of airway problems and reduction in the pulmonary function capacities. One of the major components being extensive use of air conditioner (AC), where in there is inhalation of cold air ultimately leading to an alteration in the pulmonary functions. Inhalation of cold dry air for prolonged periods leads to airway smooth muscle sensitity. Abrupt changes in the air temperature may induce rhinitis[1] even in the absence of the usual triggering allergy. Further health hazard to occupational exposure to cold air within the vehicle is relatively unexplored. There are limited studies done on drivers working in a fully enclosed air conditioner atmosphere. This study was aimed in measuring the pulmonary function test among healthy air conditioned drivers not exposed to dust and its comparison with healthy non air conditioner users and at considering whether air conditioner usage affected the pulmonary functions.

MATERIALS AND METHOD

The present study was conducted in the Department of Physiology S.R.M Medical College, Kattankulathur. The study population included 40 healthy male drivers working in an enclosed AC atmosphere as a study group and 40 healthy male non drivers working for administrative post as a control group. The age of the subject was between 25-40 years and had no history of allergic disorders, respiratory disorders like asthma, or any systemic disease, no history of smoking, chewing tobacco and intake of alcohol.

The subjects were interviewed using a structured questionnaire to obtain information on age, occupation,

age since driving, driving hours, years of experience. Body weight (kg) was measured in light clothing and height was measured in meters without footwear. Body mass index (BMI) was calculated using following equation: BMI (kg / m^2) = weight (kg) / height (m^2). Spirometry was done using computerized spirometer (EASY PRO). All the tests were carried out at the same time of the day, between 10-11 AM. All the subjects were in sitting position and wearing nose clips.[2] The subjects were asked to breathe forcefully following deep inspiration into the mouth piece attached to the pneumatachometer. Three readings were measured and the best reading was taken for analysis. Forced vital capacity (FVC), forced expiratory volume in 1st second (FEV1), Forced expiratory flow between 25% and 75%

of forced vital capacity (FEV25-75%) and peak expiratory flow rate (PEFR) were noted.

ETHICS

The study was approved by the Institutional ethical committee board and consent was taken from each subject.

STATISTICS

Statistical analysis was done using SPSS -19 software. Student's unpaired t test was used to compare the variables between the study group and the control. $p < 0.05$ was considered significant.

RESULTS

Table: 1 Descriptive statistics of the drivers

Descriptive Statistics of Drivers					
	N	Minimum	Maximum	Mean	SD
Age	40	23	54	33.73	7.020
BMI	40	17	40	25.413	4.580
Duration Per day (hours)	40	4	9	6.50	0.934
Experience (years)	40	5	34	14.95	6.425

Table 2: Comparison of Lung Volumes between Controls and Drivers

Group Statistics						
	Group	N	Mean	SD	t Value	P Value
FVC	Control	40	3.2800	.58494	1.664	0.100 NS
	Study Group	40	3.4815	.49453		
FEV1	Control	40	2.8725	.47501	1.849	0.068 NS
	Study Group	40	2.6830	.44106		
FEV1_FVC	Control	40	88.165	5.6432	5.963	0.0001 ***
	Study Group	40	77.330	10.0109		
FEF25_75	Control	40	3.5650	.74129	6.544	0.0001 ***
	Study Group	40	2.4663	.76043		
PEF	Control	40	6.6375	1.43825	1.802	0.075 NS
	Study Group	40	5.8883	2.20122		

NS – No Statistical significance difference between the group [FVC, FEV1 and PEF] at 95% (P>0.05)

*** Statistical significance difference between the groups [FEV1_FVC and FEF25_75] at 95% (p < 0.05)
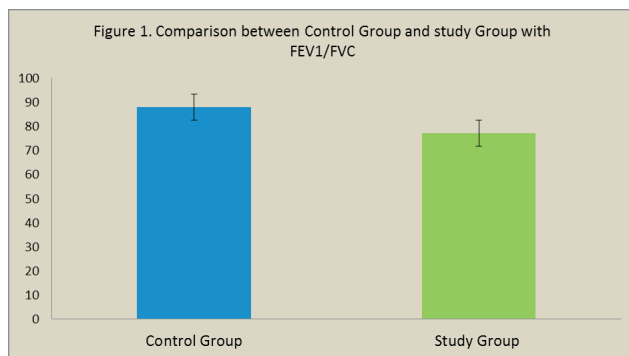
Figure 1
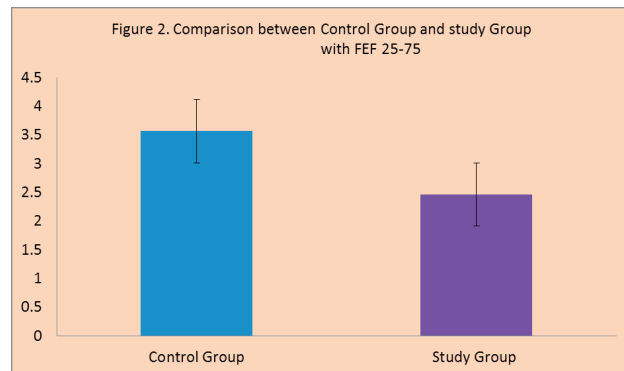
Figure 2

The descriptive statistics about subject group (drivers) is given in table 1. The average BMI of the drivers was 25.4 ± 4.5, average driving hour per day was 6.50 ± 0.934 hours and their driving experience was 14.95 ± 6.425 years. The lung function parameters of drivers and controls are presented in Table 2 and Figure 1 & 2. The results show a statistically significant decrease in FEV1/FVC and FEF25%-75% in drivers when compared to non-drivers with p values of 0.0001 respectively. Also FEV1 and PEF were lower in drivers when compared to non-drivers but it was not statistically significant. These findings suggest that the airways are getting affected due to exposure to AC work environment. This shows that, drivers had an obstructive lung disease pattern when compared to non drivers.

DISCUSSION

Urbanisation of the present world has lead to the use of air conditioning system specifically central AC which is supposed to be a necessary part of the luxurious life. Air inside is cooled and dehumidified for thermal comfort by AC system. Maintenance of this comfort zone has become common in theatres, shopping malls and travelling etc. Inhalation of cold dry air causes bronchospasm as a protective mechanism to reduce airflow in upper airways and cervical trachea to limit the entry of insufficiently conditioned inspired air into lungs.[3] Cold air challenge test also has revealed a bronchoconstriction.[4,5] Further it has been tested that hyperventilation of cold dry air causes bronchoconstriction and eupnoeic inhalation of cold, dry air increase airway resistance in asthmatic patient.[6,7] Thus Inhalation of cold dry air affects the airway and alters pulmonary functions. Intensive use of air conditioners in transport workers has increased the risk of atopic sensitization and eosinophil activity.[8][9] IgG induced sensitization and hypersensitivity pneumonitis due to bacteria, fungi and moulds in contaminated AC system has been reported.[10,11] Thus exposure to microorganism that grows in the favourable condition of the AC system can lead to human respiratory ailments.[12,13] Epidemiological studies show that persons working in air conditioned environment have increased prevalence of headache, lethargy and upper respiratory symptoms.[14]

Spirometry is a simple and useful test to identify and monitor respiratory impairment. With the proper equipment and the correct technique, maximal results can be obtained.[15] FEV1/FVC is the most sensitive indicator of airway obstruction. This ratio is decreased in drivers when compared to normals with significant value (p 0.0001) (Table 2, Fig 1). This finding indicates an obstructive pattern of pulmonary involvement in the study group. Drivers working in an enclosed AC atmosphere for a longer period of time have more chances of chronic involvement of lungs as indicated by the results in the present study. Peak expiratory Flow Rate (PEFR) is the maximum velocity in litres per minute with which air is forced out of the lungs. This is decreased in cases of airway obstruction according to American Review of Respiratory diseases[16]. Our study also shows a decrease in PEFR in drivers when compared to normal though it is not statistically significant (Table 2). FEF_{25-75} is Maximum Mid Expiratory Flow rate which determines the patency of small airways. This value is also significantly decreased in our drivers study population (p 0.0001) (Table 2, Fig 2). Thus our study correlates with Fontanneri et al [17] study on pulmonary functions in air conditioner users. Cold dry air inhalation makes the airway hyper responsive[18], could be due to airway epithelial damage. Also cold air inhalation causes airway inflammation.[19] Further inhalation of cold dry air leads to dehydration injury and desquamation of the epithelial cells of the airway leading to

1) Removal of the protective mucosal barrier.[20]

2) Loss of epithelial derived relaxation factor leading

to bronchoconstriction.

3) Sensory nerve exposure leading to "Nasobronchial reflex".

4) Activation of the parasympathetic nerves[21] bringing about broncho- constriction.

5) Exposure of submucosa, mast cell and inflammatory cell.[22]

Also cold air inhalation activates cold receptors and osmoreceptors in the nasal mucosa inducing protective bronchoconstriction response. Also they induce release of inflammatory mediators like histamine[23] and SRS –A[24] release from mast cell causing bronchospasm, airway resistance and decreasing dynamic compliance.[25] Thus subjects exposed to AC atmosphere have hyperresposive and decreased patency of airways.[26,27] Our study results also show a reduction in FEF25-75% in drivers when compared to normal's suggesting small airway diseases. Tight insulation of AC rooms leads to poor living conditions such as indoor dampness and poor ventilation. This increases the exposure to indoor air pollutants like respirable[28] mite allergens leading to allergic disorder.

CONCLUSION

Present study suggest that both the upper airways and smaller airways are getting affected in drivers even though they are working in an enclosed atmosphere with less dust exposure. Probable cause could be due to exposure to AC environment. Inhalation of cold air causes injury to respiratory passage causing inflammation and activation of mast cell along with nervous stimulation. All the above responses lead to hyper responsive airways, bronchoconstriction and reduce compliance. Thus these workers are at increased risk of developing respiratory dysfunction which can be detected at the earliest by frequent spirometer testing. This will ensure early detection of any underlying respiratory dysfunction, its treatment and prevention of complications arising later in life.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Perceived Stress and Sources of Stress among First Year Medical Undergraduate Students

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ABSTRACT

Background: Medical education throughout the world poses the incoming student with many challenging situations and demands. This forms an ideal environment for the student to be under stress as he adapts to these stress-inducing conditions.

Aim: To assess the prevalence of stress among first year medical undergraduate students, to segregate the potential stressors derived from the study and categorize them under academic, psychosocial and health related.

Materials and Method: This is a cross-sectional study involving 150 first-year medical students. Prevalence of stress was assessed using Cohen's Perceived Stress Scale (PSS-10) which is an internationally validated 10-item questionnaire. The effect of potential stressors was assessed using a 42-item questionnaire. The stressors were categorized as academic, psychosocial and health related.

Results: Of the 150 respondents, the mean PSS score was 21.09(SD: 4.7). 128 students (85.3%) reported moderate stress, 16 students (10.7%) had high stress and 6 students (4%) reported Low/No stress. The top 5 stressors were all academic or psychosocial stressors.

Conclusion: The vast majority reported moderate/severe stress and analysis highlighted a greater association with academic factors compounded by psychosocial ones. Preventive mental health measures on the basis of this and further studies into the occurrences of stress in the early academic years of a medical professional, followed by effective management tools and programs could go a long way in counteracting the harmful long term effects of stress on their careers, producing happier and more productive and efficient medical professionals.

Keywords: *Perceived stress, undergraduate, students.*

INTRODUCTION

Stress in humans results from interactions between persons and their environment that are perceived as straining or exceeding their adaptive capacities or threatening their well-being [1]. The first year medical student and the demands of medical school form a perfect stress inducing combination.

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Over the course of the year, the students are subject to multiple written and practical tests to ensure their competency and keep track of their progress. Abdhulghani et al [2] suggested that the prevalence of stress was highest amongst first-year students. The inability of the student to cope with the vast amount of content compounded by the high expectations of parents and peers, cooks up an ideal pressure situation and subjects the students to stress right from the word 'go' .Earlier research [3] has suggested similar levels of stress within groups of Year 1 medical students, with 55.6% of students reporting to have high and moderate stress. So in this study we aimed to assess the prevalence of stress among first year medical undergraduate students and to segregate the potential stressors and categorize them

under academic, psychosocial and health related.

MATERIALS & METHOD

Study Group:

150 First year medical students formed the study sample. Institutional Ethical Committee permission and approval obtained. Written informed consent was obtained from all the subjects.

Administration:

It was a cross-sectional study using a self-administered questionnaire. The questionnaire consisted of three parts: Demographic information & academics, PSS-10 questionnaire and a 33-item list of potential stressors categorized under Academic, Psychosocial and Health-related stressors. Informed Consent was obtained from each student before administering the questionnaire. The students were assured of confidentiality of the information provided and had the option of refusal to participate in the survey. The questionnaire was distributed to students during non-classroom hours and collected by the administrators a short while after.

Tools Used:

Stress was assessed using Cohen's Perceived Stress Scale (PSS-10) 10 item questionnaire, which is a reliable and valid assessment instrument for the study of stress in college students [4].The PSS-10 taps into the student's life as a whole over the past one month and does not just pertain only to academics. The PSS-10 had demonstrated good internal (intra-observer) reliability with Cronbach's alphas ranging from 0.78 to 0.91 and test- retest reliability coefficients ranging from 0.55 to 0.85[4] . Roberti et al also found that the PSS-10 was a reliable and valid instrument for assessment of perceived stress in college students[5].

The score ranges from 0 to 40.The answers are graded on a 5-point Likert Scale ranging from Never = 0, Almost Never = 1, Sometimes = 2, Fairly Often = 3 and Very Often = 4. Positively framed questions 4, 5, 7 and 8 are reverse scored, that is Never = 4 to Very Often = 0 and the scores are summed, with higher scores indicating more perceived stress.

The levels of stress were arbitrarily divided as:

- Low Perceived Stress: 0-13

- Moderate Perceived Stress: 14-26

- High Perceived Stress: 27-40

The levels of stress divisions were selected in accordance to a similar study from Bangalore [6]. The data was analyzed using Microsoft Excel 2007 and Statistical Package for Social Sciences (SPSS) Version 16 for Windows.

Data Analysis:

The analysis itself is carried out using SPSS Version 16 software producing outputs in several stages, the first being a descriptive statistics table, followed by Kaiser-Meyer-Olkin (KMO) and Bartlett's test values. The rotated component matrix is analyzed and the variables most highly loaded onto their respective significant factors were taken. The cutoff value was arbitrarily set at 0.6. These significant variables derived from the rotated component matrix (RCM) were also subsequently checked using the Pearson's chi-square values from crosstabs of the respective variables with the PSS Score. Those variables whose RCM values appeared greater than 0.6 and also displayed significant Pearson's chi-square values in their respective cross-tabs are eventually presented as significant in our study. The results and discussion section of the study deal with the individual outputs and a brief description of the tables themselves.

RESULTS

Table 1. Demographic details of the students.

VARIABLE	SUBDIVISION	PSS Score		
		Low	**Moderate**	**High**
Age	17	61		
	18	73		
	19	9		
	20	7		
Gender	Male	4(4.9%)	68(82.9%)	10(12.2%)
	Female	2(2.9%)	60(88.2%)	6(8.8%)
Medium of teaching in school	English	6(4.1%)	124(84.9%)	16(11%)
	Tamil	0(0%)	3(100%)	0(0%)
	Other	0(0%)	1(100%)	0(0%)
Residence	Day-Scholar	2(2.2%)	77(86.5%)	10(11.2%)
	Hostler	4(6.6%)	51(83.6%)	6(9.8%)
Family Details	Parents together	6(4.2%)	120(84.5%)	16(11.3%)
	Parents separated	0(0%)	8(100%)	0(0%)
Parents in health related profession	Yes	1(3.4%)	25(86.2%)	3(10.3%)
	No	5(4.1%)	103(85.1%)	13(10.7%)
On Financial Aid Scholarship	Yes	0(0%)	7(77.8%)	2(22.2%)
	No	6(4.3%)	121(85.8%)	14(9.9%)
Self Reported Academic Performance	Satisfactory	4(6.9%)	45(77.6%)	9(15.5%)
	Unsatisfactory	2(2.2%)	83(90.2%)	7(7.6%)

Table 2. a. Rotated Component Matrix of Academic Stressors:

Academic Stressors	Factor 1	Factor 2	Factor 3	Factor 4
Frequency of Examinations	.159	.728	-.030	.313
Performance in Examinations	.484	.506	-.318	.079
Academic Curriculum	.149	.715	.120	-.143
Dissatisfaction with class lectures	.266	-.061	.726	.076
Non-availability of adequate learning material	.156	-.031	.583	.305
Becoming a health professional/engineer	-.314	.372	.603	-.320
Lack of time for recreation	-.095	.083	.143	.883
Competition with peers	.636	.253	.257	.066
Performance in practical's	.775	.045	.026	-.083
Lack of Special guidance from faculty	.503	.201	.342	-.028

Table 2.b. Rotated Component Matrix of Psychosocial stressors:

Psychosocial factors	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
High Parental Expectations	.645	.142	.259	.238	-.125
Loneliness	.773	.129	-.036	-.070	.106
Family problems	.703	-.017	-.084	.288	.154
Accommodation away from home	.173	.561	-.276	.064	.278
Political situation in the country	-.006	.140	.066	.072	.743
Relations with the Opposite sex	.152	.062	.193	.640	.347
Difficulty reading textbooks	.465	.045	.349	.130	-.445
Lack of entertainment in the institution and city itself	-.148	.018	.734	.157	.062
Difficulty in the journey back home	.068	.101	.032	.742	-.133
Quality of food in the mess	-.081	.618	.097	.334	.089
Financial strain	.374	-.223	.182	.572	.209
Inability to socialize with peers	.388	-.033	.451	-.027	.504
Living conditions in the hostel	.027	.769	.191	.011	.127
Member of fraternity/sorority	.113	.300	.203	.141	.514
Lack of personal interest in subject	.280	.068	.742	.096	.168
Adjustment	.132	.728	-.044	-.183	-.023

Table 2.c. Rotated Component Matrix of Health related stressors

Health related stressors	Factor 1	Factor 2	Factor 3
Sleeping difficulties	.215	-.131	.777
Class Attendance	-.002	.271	.823
Nutrition	.723	.078	.285
Exercise	.843	.019	-.004
Quality of food in mess	.621	.477	.046
Physical disability	.209	.675	.132
Alcohol/Drug abuse/Smoking	-.020	.828	-.024

Table 3. Pearson Chi-square value of Significant factors * PSS Score

SIGNIFICANT FACTORS	PEARSON – CHI SQUARE VALUE
Frequency of Examinations	.006
Performance in examinations	.037
Academic Curriculum	.002
Lack of time for recreation	.006
Competition with peers	.026
Becoming a health professional/engineer	.036
Performance in practical's	.016
Loneliness	.001
Living conditions in hostel*	.000
Adjustment with roommates*	.019
Quality of mess food*	.000
Sleep difficulties	.039
Class attendance	.011
Nutrition	.036

- Cross-tabbed with Residence as these are hostel based problems

Response and PSS Scores:

Of the 150 respondents, the 100% response rate produced the following outcomes: 6(4%) were under no stress, 128(85%) students were under Moderate stress and 16(10.7%) were under severe stress. The mean PSS Score was 21.09(SD: 4.74). Males had a higher mean PSS Score of 21.23(SD: 5.18) compared to female's mean PSS score of 20.74(SD: 4.38). *Note:* The demographic details are given in *Table 1*.

Significant Stressors:

The most statistically significant stressors can be categorized under Academic, Psychosocial and Health-related stressors. The most significant Academic stressors were: - Frequency of examinations, Performance in examinations, Academic Curriculum, Lack of time for recreation, Competition with peers, Becoming a health professional/engineer, Performance in practical's.

The corresponding KMO value for academic factors was 0.671. Bartlett's test of sphericity value for the same was 0.

The most significant Psychosocial stressors were: - Loneliness, Living conditions in the hostel, Adjustment with roommates, Quality of mess food. The corresponding KMO value for psychosocial factors was 0.742. Bartlett's test of sphericity value for the same was 0.

The most significant Health-related stressors were: - Sleeping difficulties, Class attendance and Nutrition. The corresponding KMO value for health-related factors was 0.654. Bartlett's test of sphericity for the same was 0. The Rotated component matrices of the various stressors are given in Tables 2.a, 2.b, 2.c. The Pearson chi-square value of the significant factors cross-tabbed with their PSS scores is provided for reference in Table 3.

DISCUSSION

The Mean PSS Score of all the students was 21.09(SD = 4.74). This was higher when compared to similar studies in Bangalore [6] (Mean PSS Score- 20.29(SD = 6.24) and Malaysia [8] with a Mean PSS Score of 20.4. However, a study in Pakistan [9] had a significantly higher mean PSS Score of 30.84(SD: 7.01).

The mean PSS score in Males was slightly higher than females; however the difference was not statistically significant. Studies by Saipanish et al [10] suggested that the most frequently occurring sources of stress were academic.

Solanky et al[3] in a separate study reported factors responsible for stress identified in first year students-increased load towards exam, vast syllabus, not getting expected marks, less time for repeated learning and procrastination.

The frequency of examinations was indicated to be a stressor sometimes or often/always by 94.6% of respondents, out of which half (51%) reported it as always being a stressor. This may be due to the fact that internal assessments are quite frequent, each one being counted towards a small percentage in the final exams.

Performance in examination, being quoted as sometimes/always a stressor by 89% of respondents, of which quite a large 40% have indicated it to be always a stressor. Although the performance in examinations fell below the cutoff 0.6 value on analysis from the rotated component matrix, we felt it to be a valuable result considering the overwhelming positive stress responses discussed above, as well as a significant Pearson's chi-square of 0.037.

Competition with peers has emerged significant likely due to the nature of the profession and the fact that highly meritorious students usually end up in the field of medicine. An interesting correlation was seen on comparing the competition with peers with the residence status of respondents. 21% of day scholars reported it to be often/always a stressor, whereas only 8% of hostellers did the same. This could be due to the camaraderie resulting from sharing living premises in the hostel, although the difference was not statistically significant.

Of the psychosocial factors analyzed in our study, loneliness, living conditions in the hostel, adjustment with roommates and the quality of mess food were significant. The combined effect of these stressors could leave students with little time to socialize. A study by Dahlin et al [1] has also highlighted rather insidious statistics- the prevalence of depressive symptoms was 12.9%, which was higher than in the general population. Loneliness could predispose a student to these disorders.

Living conditions in the hostel and quality of mess food were found to be significant on factor analysis but

failed to reproduce the same results on Pearson's chi-square analysis. However, since these factors are more pertinent to hostellers, we also analyzed the cross-tabs of these respective variables with residence to try and isolate the responses of hostellers from day scholars. These cross tabs proved to be significant with Pearson's chi-square values of a maximum of 0.019. Another such factor that was significant on both factor analysis and Pearson's chi-square was adjustment with roommates. Most first year hostellers are exposed to the hostel environment for the first time. This drastic transition from the comfort of their home, hinges to a great extent on their adjustment with their roommates. This could prove a major stressor where compatibility does not exist. Wolf et al [11] also found that stress in first year medical students was higher and suggested that this was due to entry into a large professional college, which was making students feel insecure during the initial period.

The health related stressors reported were nutrition, sleeping difficulties and class attendance. Nutrition is reported by 70% of hostellers as compared to 51% of day scholars. This could indicate that food provided by the mess is less than ideal. The nutrition cross-tab with the PSS score also presents a Pearson's chi-square value of 0.015, indicating its significance.

Sleeping difficulties was reported as a significant stressor by 64% of respondents, of which 26% reported it as often/always. This could be a result of the various significant stressors discussed earlier in this study. Class attendance also turned out to be a significant stressor. Students are supposed to maintain an attendance percentage of 80% and above in order to be eligible to appear for the final exam. This, compounded by the allotment of 3 back to back 1-hour theory lecture classes following a 2 hour dissection class in the morning could prove to be tasking the students mentally. Allotment of appropriate breaks between classes could go a long way in increasing the attentiveness and effective learning of the student from these classes.

LIMITATIONS

The lack of a larger sample size is one of the limitations that need to be considered in our study. Factor analysis attempts to find patterns between variables and benefits from larger sample sizes. Some of the stressors that emerged as significant, such as the class attendance and nutrition, lack generality and could vary widely from institution to institution. Although these stressors are specific to the institution studied, others could take away that these same stressors, if not addressed, could impact students in much the same way.

This study has used a different tool in Factor Analysis to produce the outputs, and differs in geographic locality from previous studies referred to in this article. Notwithstanding these differences, the stressors derived are broadly similar, underlining the common denominating variables between medical college undergraduates and the need to develop effective methods to address and alleviate the same.

CONCLUSION

The students reported higher levels of stress. The most frequently occurring stressors among the students were related to academic and psychosocial domains. To prevent such occurrence special care should be taken for establishing counseling. Preventive mental health services as an integral part of routine clinical services should be provided to the medical students to find out obvious psychiatric problems or psychological distress and treat them at the earliest.

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Comparative Study of Hand Grip Strength and Endurance Time in Vegetarians and Mixed Vegetarians

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ABSTRACT

Introduction: The present study was conducted to compare the hand grip strength and endurance time in vegetarians (V group) and mixed vegetarians (MV group).

Materials and Method: This study is a cross sectional study includes 201 subjects of age group 20-45 years, among them 98 were vegetarians and 103 were mixed vegetarians.

Results: Physical characteristics of 'V' group, the mean height (mt) was 1.61 ± 8.58, the mean weight (Kg) was 60 ± 9.34 and the mean BMI (Kg/mt2) was 23.08 ± 2.48. The physical characteristics of 'MV' group, the mean height (mt) was 1.64 ± 9.46, the mean weight (Kg) was 66 ± 9.62 and the mean BMI (Kg/mt2) was 24.52 ± 2.78. Our study shows that the hand grip strength in 'V' group was 25.85 ± 6.65 and in 'MV' group was 32.75 ± 8.65. p value highly significant in 'MV' group ($p<0.0001$). The endurance time in 'V' group was 0.69 ± 0.38 and in 'MV' group was 1.16 ± 0.73. There was a significant difference in endurance time between 'V' group and 'MV' group with p value highly significant in 'MV' group ($p<0.0001$).

Conclusion: Mixed vegetarian group are better compared to vegetarian group with respect to strength exercises like hand grip strength and endurance time. Mixed vegetarian diet which includes regular vegetarian diet and occasional non vegetarian diet is helpful as far as physical fitness is considered.

Keywords: Hand grip Strength, Endurance time, Vegetarian, mixed Vegetarian.

INTRODUCTION

Now a days Vegetarian diet is becoming more popular among the population more so among the westerners. A large number of individuals around the world follow nonvegetarian diet, but in most countries vegetarians comprise only a small proportion of the population. India is a notable exception because a substantial proportion of the population, perhaps approximately 35%, follows a traditional vegetarian diet [1,2]. Vegetarian diets provide relatively large amounts of cereals, pulses, nuts, fruits and vegetables. In terms of nutrients, vegetarian diets are usually rich in carbohydrates, n-6 fatty acids, dietary fiber, carotenoids, folic acid, vitamin C, vitamin E and Mg, and relatively low in protein, saturated fat, long-chain-3 fatty acids, retinol, vitamin B12 and Zn; vegans may have particularly low intakes of vitamin B12 and low intakes of Ca[1]. In recent years several publications have claimed that vegetarians are healthier than non-vegetarians, as evidenced by their greater longevity and lesser disorders related to morbidity[3,4]. Peter Deriemaeker et al, in their study concluded that vegetarian lifestyle has no negative impact on the health status at older age[5].

Epidemiological studies on vegetarians show that appropriately planned vegetarian diets are healthy and nutritionally adequate [3,4]. Compared to omnivorous diets, vegetarian diets can provide several health benefits[5]. The study conducted by Khanna G. L et al, shows that in their group the prevalence of non-vegetarianism was

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noted high in Indian sports women than lacto, ovo lacto vegetarianism. Nutrient intake, hemoglobin level, endurance time was better in non-vegetarians than lacto, ovolacto vegetarians[6]. As some studies indicate vegetarian diet is beneficial and some indicate nonvegetarian diet is beneficial, we intended to take this study to compare the handgrip strength and endurance time in vegetarians and mixed vegetarians. As a measure of physical function, hand grip strength is cheap and simple, often used to evaluate muscle strength [7] Hand grip strength is a physiological variable that is affected by a number of factors including age, gender and body size among others[8,9] (Baskaran et al and Bassey and Harries) Hence measurement of handgrip strength and endurance time was included in our study.

Aims and objectives of study are to measure Hand grip strength in vegetarians and mixed vegetarians, to determine Endurance time in vegetarians and mixed vegetarians and to compare handgrip strength and endurance time in both vegetarians and mixed vegetarians.

MATERIALS & METHOD

This study is a cross sectional study, consisting of 201 subjects included both males and females of age group 20-45 years. 98 subjects for vegetarian group and 103 mixed vegetarian group each were selected for the study. This study was done in Department of Physiology, Hassan Institute of Medical Sciences, Hassan, after obtaining Ethical clearance and informed consent from the subjects. The following are the inclusion and exclusion criteria: Healthy vegetarians, Healthy mixed vegetarians of Age group of 20 to 45 years were included for the study. Those suffering from hypertension, diabetes, any neuromuscular disorders, paralysis or hemipariesis, history of smoking or alcoholism and History of intake of any drugs were excluded from the study. Based on dietary intake on self-reported dietary habits the participants were divided into vegetarian (V) and mixed vegetarian (MV) categories. The dietary data was collected using Dietary Recall Method.

Body height (BH) was measured standing against a wall without shoes, using a measuring tape in centimeters. Body weight (BW) with light indoor clothing.

Measurement of Hand grip strength by using a Handgrip Dynamometer (Jagson India make). Handgrip strength was measured in subjects in seated position with elbow by their side and flexed to right angles, and a neutral wrist position and provision of support underneath the dynamometer. In this position the subject is asked to compress or squeeze the handgrip strength dynamometer with one's maximum strength. Hand grip strength can be quantified by measuring the amount of static force that the hand can squeeze around a dynamometer. The mean of three trials of grip strength is taken. This is referred to as maximum isometric tension T_{max} in Kgs and Endurance time is measured by the time of onset of fatigue for 70% of Tmax.[10,11,12,13,14] seconds.

Statistical analysis: Descriptive statistics such as mean, SD and percentage was used. Comparison between vegetarians (V) and mixed vegetarians (MV) for continuous variable was done by unpaired 't' test.

RESULTS

201 subjects were selected for the study out of these 29 subjects were in the age group 20-24 years, 43 subjects were in the age group of 25-29 years, 58 subjects were in age group 30-34 years, 35 subjects were in the age group 35-39 years and 36 subjects were in the age group 40-44 years (Table-1). On analysis of physical characteristics of 'V' group, the mean height (mt) was 1.61±8.58, the mean weight (Kg) was 60±9.34 and the mean BMI (Kg/mt²) was 23.08±2.48.The physical characteristics of 'MV' group, the mean height (mt) was 1.64±9.46, the mean weight (Kg) was 66±9.62 and the mean BMI (Kg/mt²) was 24.52±2.78 (Table-2).

Table -1: Age group and distribution of subjects

Age Group	Frequency
20-24	29
25-29	43
30-34	58
35-39	35
40-44	36
Total	201

Table-2: Physical data of study subjects

	Diet	Mean	Std. Deviation
Height	V	1.6078	8.58497
	MV	1.6393	9.46434
Weight	V	60.0306	9.33948
	MV	66.0971	9.62178
BMI	V	23.0802	2.47938
	MV	24.5183	2.78013

V: Vegetarian group, MV: Mixed vegetarian group

Table-3: Hand grip strength and Endurance time in vegetarians and mixed vegetarians

	V	MV	Mean difference	t-value	p-value
Hand grip strength	25.85 ± 6.65	32.75 ± 8.65	6.90	6.32	<0.0001[HS]
Endurance time	0.69 ± 0.38	1.16 ± 0.73	0.48	5.71	<0.0001[HS]

V: Vegetarian group, MV: Mixed vegetarian group. All values expressed as Mean and SD. Analysis for all parameters done by Unpaired 't' test. HS – Highly significant.

Comparison of parameters like hand grip strength and endurance time between 'V' group and 'MV' group showed statistically highly significant increase in 'MV' group.(Table-3 & Fig-1).

Our study shows that the hand grip strength in vegetarian group was **25.85 ± 6.65** and in mixed vegetarians was **32.75 ± 8.65.T**here was a significant difference in hand grip strength between 'V' group and 'MV' group with P value highly significant in 'MV' group (p<0.0001).
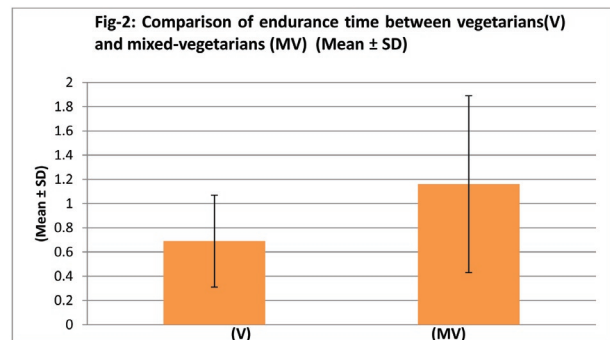
Fig- 1: Comparison of hand grip strength between vegetarians (V) and mixed-vegetarians (MV) (Mean ± SD)

Fig-2: Comparison of endurance time between vegetarians(V) and mixed-vegetarians (MV) (Mean ± SD)

The endurance time in 'V' group was **0.69 ± 0.38** and in 'MV' group was **1.16 ± 0.73.T**here was a significant difference in endurance time between 'V' group and 'MV' group with P value highly significant in 'MV' group (p<0.0001).(Table-3 & Fig-2).
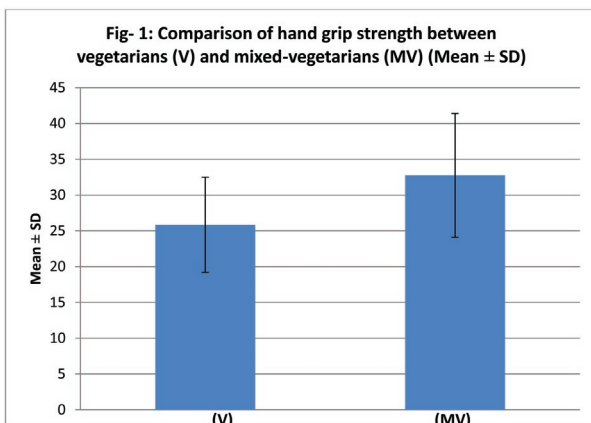
DISCUSSION

This study was conducted to know the comparison of Handgrip strength and Endurance time in vegetarians and mixed vegetarians. As most of our subjects were not regular non vegetarians and were occasional non vegetarians, hence we preferred to call them as mixed vegetarians. In our study we found that hand grip strength was significantly higher in MV group compared to V group (p<0.0001). **Foo**. **L H**. noted that handgrip strength determines the muscular strength of an individual. So, an increase in handgrip strength determines the physical strength of an individual [15]. **Varte L R et al,** found that the grip strength was statistically significantly higher among the non-vegetarian

groups as compared to the vegetarian groups. Women who were vegetarian were less heavy than their non-vegetarian counterparts[2]. Similarly in our study we found that the vegetarian group had a lesser weight compared to the mixed vegetarian counterparts and also in our study handgrip strength was higher among mixed vegetarian group compared to vegetarian group. **Chris Forbes-Ewan**, in their study concluded that the fact that vegetarian diets are associated with improved health outcomes compared to omnivorous diets does not necessarily imply that vegetarian diets are superior for performance in strength sports or any other strength-dependent activities. If meat consumption does enhance strength, the mechanism could be increased testosterone synthesis (possibly through intake of saturated fat) or increased storage of creatine phosphate in muscle[16]. According to **Barr & Rideout** there is little evidence that athletic performance differs much between vegetarians and non-vegetarians, as long as the diet is nutritionally adequate, but more data are needed. Particular care needs to be taken to ensure adequate Fe status, and there is some evidence that the lower muscle creatine concentration in vegetarians may reduce supramaximal exercise performance[17]. In our study also we noted significantly longer endurance time in mixed vegetarians compared to vegetarians(p< 0.0001) Khanna G. L et al, in their study noted that Nonvegetarians were able to carry on the exercise for a longer time than lacto vegetarian and ovolacto vegetarians and also noted endurance time was better in non-vegetarians than lacto or ovolacto vegetarians. endurance time was longer and recovery was fast in non-vegetarian, which could be a result of nutrient intake and high hemoglobin concentration. Also they concluded that good nutrition is important for maintaining a high level of performance[6].

CONCLUSION

India is a diverse country with a variety of diet practices which may have diverse effects on the physical fitness of the body. In our study we included vegetarians and mixed vegetarians and compared their Handgrip strength and Endurance time and it can be concluded that mixed vegetarian group are better compared to vegetarian group with respect to strength exercises like hand grip strength and endurance time. Mixed vegetarian diet which includes regular vegetarian diet and occasional non vegetarian diet is helpful as far as physical fitness is considered. However a study with larger population samples and detailed diet intake assessment is required for better conclusion.

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A Comparative Study of Intraocular Pressure in Normal Subjects and Patients with Type 2 Diabetes with and without Diabetic Retinopathy

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ABSTRACT

Context: Diabetes Mellitus (DM) is a common progressive disease and one of the major causes of blindness as well as visual morbidity in not only developed countries but also in developing countries like India[1].

Therefore, the present study has been undertaken to review the relationship between intraocular pressure in normal subjects and in T2DM - with and without Diabetic Retinopathy (DR) . The patients are of a known duration of diabetes mellitus comprising of an age group of 40-70 years.

Objective:

1. To compare the intraocular pressure between normal subjects and patients having Type 2 diabetes.

2. To compare the intraocular pressure between T2DM patients of known duration of diabetes mellitus with diabetic retinopathy (proliferative and non proliferative) and those without diabetic retinopathy.

Method: Total 104 subjects were considered of ages 40 -70 years and were divided under various groups.

Control Group: Group A (30) Healthy volunteers .

Study groups with Type 2 Diabetes : Group B (30 without retinopathy , Group C (30) with non proliferative diabetic retinopathy and Group D (14) with proliferative diabetic retinopathy.

Intraocular pressure was measured using iCare tonometer and Indirect Ophthalmoscopy using an ophthalmoscope. The readings were taken between 9:00 am to 11:00 am.

Statistical analysis was done using spss 16.0 by descriptive analysis , one way anova and univariate anova analysis, scheffe's test.

Results: The mean IOP in the left and right eye is higher in type 2 diabetics without diabetic retinopathy than non diabetic population but not statistically significant (p>0.05) . The mean IOP is however lesser in Group C than when compared to group B and the mean IOP is higher in Group D as compared to Group C. However, these differences were not statistically significant (p>0.05).

Interpretation and Conclusion: The study suggests that Intraocular pressure was found to be greater in diabetic population than the non diabetic population .The reason could be due to accumulation of fibronectin material in the trabecular meshwork tissue. As diabetes progresses, the intraocular pressure was found to be lesser in non proliferative diabetic retinopathy and increased in proliferative diabetic retinopathy as compared to the former but not statistically significant.

Keywords: Intraocular Pressure, Diabetes Mellitus, NPDR, PDR

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INTRODUCTION

A nationwide diabetes study done by Indian Council of Medical Research-Indian Diabetes study (ICMR-INDIAB) states that India currently has 62.4 million people with Diabetes[2]. The health expenditure associated with Type 2

Diabetes Mellitus (T2DM) is increasing worldwide, thus making it a public health disorder. India is tipped to have the highest number of diabetics in the entire world by the year 2020.

Type 2 Diabetes Mellitus (T2DM) patients are more prone to have open angle glaucoma (OAG) [1,3,4]. Primary open angle glaucoma (POAG) is a progressive disease having a major impact on the daily functioning of the people as it leads to blindness.

Worldwide the drastic improvements in the health care systems are increasing the life expectancy and thus in turn increasing the number of aging population. This gives us a clear picture of the increase in the prevalence of Open angle glaucoma(OAG).

Various studies give conflicting opinion about the association of Diabetes Mellitus and Primary Open Angle Glaucoma (POAG). Klein B E et al, Dielemans et al and Mitchell et al suggested a positive association in their studies [5-7].

Therefore, the present study has been undertaken to review the relationship between intraocular pressure in normal subjects and in T2DM (with and without DR) of a known duration of diabetes mellitus, comprising of an age group of 40-70 years and the presence of glaucoma in them which is one of the permanent causes of blindness.

MATERIALS AND METHODOLOGY

Study Design: Observational, Cross Sectional Study

Statistical analysis was done using spss 16.0 by descriptive analysis , one way anova and univariate anova analysis.

Study setting:

Out Patient Department, Department of Ophthalmology, K.R. Hospital, Mysore Medical College and Research Institute, Mysore.

Study period:

6 months (December 2012 to May 2013)

Source of data:

An informed consent was taken from the subjects and patients before the procedure.

30 Healthy volunteers in the age group 40-70 years who were attenders of patients visiting the Out Patient Department, Department of Ophthalmology, K.R. Hospital, Mysore Medical College and Research Institute, Mysore

forms the control group (Group A) . The study groups were as follows: 30 Type 2 diabetes patients without retinopathy (DMWR) formed group B. Group C had 30 Type 2 diabetes patients with non proliferative diabetic retinopathy (DMNPDR) and Group D had 14 Type 2 diabetes patients with proliferative diabetic retinopathy (DMPDR). The duration of diabetes was taken into consideration. All the females in the study were post menopausal.

Sample Size: A total of 104 subjects.

• Group A : Healthy volunteers (control) = 30

• Group B : Patients with type 2 diabetes without Retinopathy (DMWR) = 30

• Group C : Patients with type 2 diabetes with Non Proliferative Diabetic Retinopathy (DMNPDR) = 30

• Group D : Patients with type 2 diabetes with Proliferative Diabetic Retinopathy (DMPDR) = 14

ETHICAL CLEARANCE:

Ethical clearance was obtained from 'Mysore Medical College & Research Institute Ethical Committee for Research' to conduct the study.

INCLUSION CRITERIA:

1. Group A : Healthy (males and females) volunteers in the age group 40 to 70 yrs with no medical condition forms the control group.

2. Group B : Type 2 Diabetes patients in the age group 40 to 70 years without diabetic retinopathy (males and females) .

3. Group C : Type 2 Diabetic patients in the age group 40 to 70 years with non proliferative diabetic retinopathy (males and females) .

4. Group D : Type 2 Diabetes Patients in the age group 40 to 70 years with Proliferative Diabetic Retinopathy (males and females) .

EXCLUSION CRITERIA: 1. For Group A:

Family history of glaucoma, History of smoking, or tobacco consumption in any form,History of myopia,History of consuming alcohol,History of cardiovascular disorders, History of diabetes, History of hypertension, History of ocular surgeries, Obesity.

2. For Group B:

Family history of glaucoma, History of smoking, or tobacco consumption in any form,History of myopia,History of consuming alcohol,History of cardiovascular disorders, Retinal changes due to diabetes ,History of hypertension,History of ocular surgeries,Obesity.

3. For Group C,D:

Family history of glaucoma,History of smoking, or tobacco consumption in any form,History of myopia,History of consuming alcohol,History of cardiovascular disorders, History of hypertension,History of ocular surgeries,Obesity.

METHOD OF COLLECTION OF DATA

The Intraocular Pressure was measured in sitting position and strictly between 9:00 am to 11:00am to avoid diurnal variation. The patients were advised not to drink any beverages (tea, coffee) before examination. Before the clinical examination the history was taken and anthropometric parameters of the subjects were recorded.

PARAMETERS RECORDED

1. Anthropometric measurements : Height was measured in centimetres using a staediometer.Weight was measured in kilograms.

2. Pulse rate was measured in beats /minutes by palpating the radial artery manually.

3. Blood Pressure was measured in mmHg using mercury sphygmomanometer in siting position.

4. Intraocular pressure in mmHg using iCare tonometer (based on rebound or dynamic tonometry) during 9:00am to 11:00am

5. Direct Ophthalmoscopy using Heine Beta [R] 200 ophthalmoscope (to visualize the retina).

RESULTS
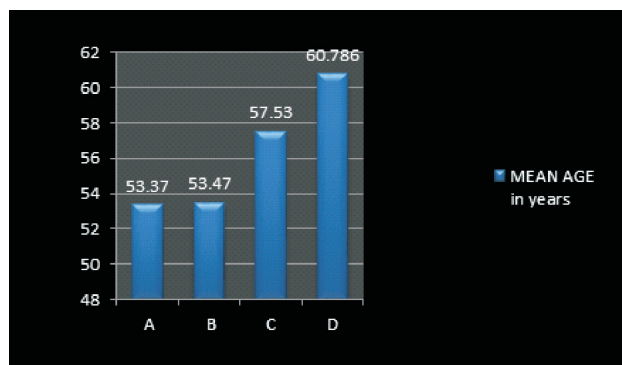
Figure 1: Mean age (in years) of various groups
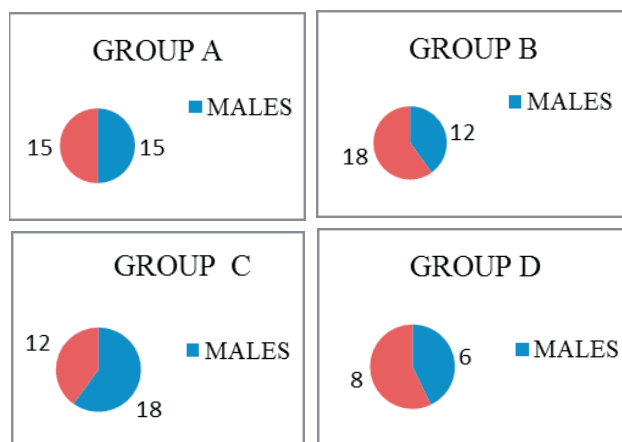
Figure 2: Gender Distribution across various Groups

Intraocular pressure: The mean IOP in all the groups were within normal range. The IOP in all 30 normal subjects was within the normal range. In Group B (DMWR) patients out of 30, 5 subjects had IOP above the normal range. The IOP in all Group C (DMNPDR) patients was within the normal range. Out of 14, 3 patients had IOP above the normal range in Group D (DMPDR) patients (Table 1).

TABLE 1

ONEWAY ANOVA DESCRIPTIVES – IOP RIGHT EYE (IOPRT) AND IOP LEFT EYE (IOPLT)					
	N	MEAN	SD	MINIMUM	MAXIMUM
A	30	13.43	1.995	11	20
B	30	18.47	4.790	13	38
C	30	12.43	2.176	9	20
D	28	14.93	3.540	9	20
TOTAL	118	14.80	4.073	9	38
A	30	12.87	1.995	9	18
B	30	17.43	4.454	11	28
C	30	12.57	2.161	9	17
D	29	16.21	6.852	6	34
TOTAL	**119**	**14.55**	**4.326**	**6**	**34**

As the number of subjects in group A,B,and C are 30 and Group D is 14 the samples are not homogeneous so the SCHEFFE test was been done to bring the sample to a homogeneous value of 23.33 in each group .Accordingly, the mean

IOP measurements are as follows:

IOPRT :

GROUP A: 13.43mmHg

GROUP B: 18.47 mmHg

GROUP C: 12.43 mmHg

GROUP D: 14.93 mmHg

IOPLT:

GROUP A: 12.87 mmHg

GROUP B: 17.43 mmHg

GROUP C: 12.57 mmHg

GROUP D: 16.21 mmHg

The mean IOP levels in all the groups were normal i.e; between 12- 20mmHg. In the control group (Group A) the mean IOP of 13.43±1.995 mmHg Eye) and 12.87± 1.995 mmHg (Left Eye) and The mean (Right **FIGURE 3: Mean IOP in all Groups**
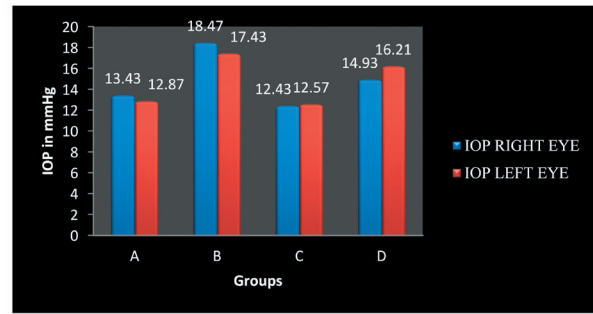
IOP in the Study group B is 18.47± 4.790 mmHg(Right Eye) and 17.43 ± 4.454 mmHg(Left Eye). Thus showing that diabetic population without retinopathy have a higher IOP than control population of the same age group of 40-70 years of age.This is however not statistically significant (p>0.05). The mean IOP is however lesser in Group C than when compared to group B and the mean IOP is higher in Group D as compared to   Group C. However, these differences were not statistically significant (p>0.05).

However, there was a very significant (p=0.000) difference in the IOP of right and left eye between the various groups. (TABLE 2).

TABLE 2: ANOVA TEST FOR IOPRT AND IOPLT

		SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE (P VALUE)
IOPRT	BETWEEN GROUPS	627.631	3	209.210	19.351	.000 (VS)
	WITHIN GROUPS	1081.129	100	10.811		
	TOTAL	1708.760	103			
IOPLT	BETWEEN GROUPS	491.202	3	163.734	11.398	.000(VS)
	WITHIN GROUPS	1436.557	100	14.366		
	TOTAL	1927.760	103			

VS : VERY SIGNIFICANT P<0.001

DISCUSSION

It has been estimated that the global burden of Type 2 diabetes mellitus will increase to 438 million in 2030.Similarly, for India it is going to increase to 87 million in 2030[8]. The impacts of T2DM are considerable: as a lifelong disease, it increases morbidity and mortality and decreases the quality of life[9]. Diabetic retinopathy is the most common microvascular complication of diabetes mellitus and a leading cause of blindness amongst diabetic population. The relative risk of blindness in persons with diabetes has been reported to be 5.2 times the risk of those without diabetes.[10]

Diabetes, diabetic retinopathy, and their various treatments can each influence a patient's risk of developing not only neovascular glaucoma, but also open angle, narrow angle, and secondary glaucoma as well[11]. The mechanism by which diabetes may increase the risk of glaucoma remains speculative. According to some studies, the reason for increase in IOP in diabetics could be due to accumulation of fibronectin material in the trabecular meshwork tissue.[12,13] Also optic nerve head is said to be more vulnerable to increased IOP in diabetics[14].

The mean IOP levels in all the groups were normal i.e; between 12- 20mmHg. In the control group the mean

IOP of 13.43±1.995 mmHg (Right Eye) and 12.87± 1.995 mmHg (Left Eye) and The mean IOP in the Study group B is 18.47± 4.790 mmHg(Right Eye) and 17.43 ± 4.454 mmHg(Left Eye). Thus, suggesting that , the mean IOP in the left and right eye is higher in type 2 diabetics without diabetic retinopathy i.e, group B than the control group A consisting of non diabetic population.

These findings are similar to the study done previously by Arora VK, Prasad VN[1] in 1989 on which concluded that Type 2 diabetes patients have a higher intraocular pressure than normal healthy persons of the same age group.

In the present study, group B patients with DMWR had a higher mean IOP compared to that of Group C DMDR who had a lesser mean IOP of 12.43± 2.176 mmHg (Right Eye) and 12.57 ± 2. 161 mmHg (Left Eye) .

Therefore, in this study it was observed that Type 2 diabetes patients especially those without diabetic retinopathy had a higher IOP than compared to the general population.

CONCLUSION

Elevated intraocular pressure (IOP) is a matter of concern in T2DM patients as it is one of the major risk factors for glaucoma which is in turn a leading cause blindness.

The following conclusion was drawn from the results of the present study:

The mean IOP of T2DM patients without retinopathy and with diabetic retinopathy was more than the mean IOP of normal subject when their age and gender were matched. However they were not significantly more. This suggests that Diabetes leads to an excessive accumulation of fibronectin in the trabecular meshwork through an over expression of fibronectin due to changes in gene expression. The excess fibronectin leads to an increase in the aqueous outflow resistance[12,13]. Also optic nerve head is said to be more vulnerable to increased IOP in diabetics[14]. Diabetes not only increases the incidence of elevated intraocular pressure and the risk of vascular compromise but also impair neuronal and glial metabolism and promote apoptosis[15].

From the above stated derivations it is clear that IOP was found to be higher amongst T2DM patients than the general population. Therefore , it is clear that more of diabetic population needs to be screened routinely and treated promptly for glaucoma as the blindness in them is irreversible and its complications cause a heavy economic burden for the diabetic patients themselves, their families and the society altogether.

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Correlating the Upper Limb Muscle Strength and Endurance with the Severity of Chronic Obstructive Pulmonary Disease

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ABSTRACT

In chronic obstructive pulmonary disease (COPD) patients the skeletal muscle impairment leads to easy fatigability of their skeletal muscles. COPD patients have reduced ability to sustain repetitive muscular contractions and that their muscles fatigue rapidly compared to healthy people. Easy fatigability of their skeletal muscles is one of the major limiting factors in doing day-to-day activities in patients suffering from COPD. Most of the studies assessed the lower limb muscle strength and endurance in COPD patients. Only few studies compared the upper limb muscle strength in COPD patients. Upper limb muscle is equally important in day-to-day activities like combing, driving, writing etc. The aim of our study is to correlate the upper limb muscle strength, endurance in COPD patients of different severity in the age group between 40-60 years. This study is a cross sectional study and was carried out among 60 subjects in two groups with 30 in each group, Group A as controls and Group B with COPD patients. Muscle strength and endurance were assessed in the flexor muscles of dominant forearm of both groups by using Mosso's ergograph and the point of fatigability was confirmed by continuous E.M.G recordings. In the end we found that in COPD patients the upper limb muscle strength and endurance were markedly reduced with the increasing severity of COPD.

Keywords: *COPD, Upper limb muscle strength, Endurance.*

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is the fourth leading cause of death in the world and exercise intolerance is often the COPD patient's chief complaint. A number of studies show that the presence of easy fatigability in COPD patients. Most of the studies [1–4] assessed the lower limb muscle strength and endurance in COPD patients. Many exercise programs focus on lower-extremity training. Only few studies [5,6] compared the upper limb muscle strength in COPD patients. As upper limb muscle is also equally important in day-to-day activities like combing, driving, writing etc. Patients with chronic obstructive pulmonary disease undergo several degrees of impairment in the capacity to perform day to day physical activities. Impairment of their ventilatory function contributes to the main limiting factor for exercise capacity in most patients[7]. However, other extra pulmonary factors also play a significant role in limiting exercise. The pathological alterations in the skeletal muscle of COPD patients itself is a cause for exercise intolerance. In the skeletal muscle of COPD patients, there is a reduced proportion of type I fibers, an increase in type II fibers and Oxidative enzyme activity is decreased, and measurement of muscle bioenergetics during exercise reveals a reduced aerobic capacity[8]. Skeletal muscles have two functional characteristics: strength and endurance. Strength of the muscle can be defined as the maximal contractile force produced per square centimeter of the cross sectional area of the skeletal muscle. Endurance of the muscle refers to its capacity to withstand (in time) the power produced during activity [9]. Our study takes into account both these factors for assessing skeletal muscle. The purpose of the study is to correlate the upper limb muscle strength, endurance in COPD patients of different severity in the age group

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between 40-60 years.

MATERIALS AND METHOD

This study was conducted in the Institute of physiology and experimental medicine in collaboration with Department of thoracic medicine, Madras Medical College, Chennai. Total number of subjects included in the study was 60. They were divided into group A and group B of 30 each. The group B consists of 30 well established diagnosed COPD patients as (study group, n =30) and same age, height and weight matched healthy volunteers were recruited as group A (controls, n = 30). Group B were again subdivided into Mild subgroup, Moderate subgroup and Severe subgroup depends upon their FEV1 % by ATS staging of COPD [10] which is used commonly to assess the severity of COPD.

ATS STAGING OF COPD

Stages	Stage I	Stage II	Stage III
FEV1 (predicted)	More than or equal to 50%	36 to 49 %	Less than or equal to 35 %

Normal healthy volunteers were recruited from Master Health check up scheme. Healthy status was assessed by a systematic medical interview, general physical examination and normal pulmonary function tests and laboratory tests.

Inclusion criteria for Group A (controls) are Males of 40-60 years of age, Weight 50-70Kgs, Height 150-170cm, No history of smoking, Used to normal physical activity, Mid forearm circumferences is between 9 to 9.5 inches, FEV1 84-120 % 0f predictive value. Exclusion criteria for Group A (controls) Females, Smokers, Any form steroid usage, Any known diseases Example Cardiac diseases, renal diseases, liver diseases and upper limb dysfunction. Inclusion criteria for group B (patients) were Males of 40-60 years of age, Weight 50-70Kgs, Height 150-170cm, history of smoking more than 5 years and 5 Packets/day, Mid forearm circumferences is between 9 to 9.5 inches, Clinically stable for more than 4 months from the last exacerbation, FEV1 18- 76% of predictive value and not reversible. Exclusion criteria for group B (patients) were females, Chronic disorders like Cardiac diseases, Diabetes mellitus, Renal disorders, Endocrine disorders, COPD with complications like right heart failure, any form of steroid intake and upper limb dysfunction. Written consent was obtained from both COPD patients and healthy volunteers. The proposal was approved by the Ethical committee of Madras medical college. Both groups-A and group-B, individuals were subjected to the Pulmonary function test using spirometry of (Super Spiro, U.K) real time flow loop spirometry machine before and after salbutamol inhalation. Spirometry was performed in all the people selected for study both before and after inhalation of bronchodilator (400 μg of inhaled Salbutamol). Those with post Bronchodilator FEV1/FVC ratio less than 70% and FEV1% reversibility less than 15 % were selected for study and labeled as COPD patients. Those with post bronchodilator FEV1/FVC ratio more than 70% were labeled as controls. Those with FEV1% reversibility more than 15% were excluded from this study (as they were asthmatics). All parameters were checked for normality of distribution. Strength of Flexor muscles was assessed in the dominant forearm of both groups by using Mosso's ergograph. The maximum weight(in kilograms) that is pulled for three consecutive times, each in 3 seconds,was considered the strength of the muscle [11]. Endurance of the Flexor muscles was assessed as suggested by in the dominant forearm [12]. The volunteer was asked to hold the weight equaling 50% of his maximum strength (which was assessed by Mosso's ergograph as mentioned above) till task failure occurs. The time duration from the start of the task-to-task failure was considered to be the endurance. It was measured in minutes. Task failure was defined by one of the two criteria either inability to maintain forearm flexion equivalent to =80% of the maximum flexion or inability to continue the exercise due to invalidating symptoms. To rule out subjective involvement, the point of fatigability was confirmed by continuous E.M.G recordings. For this purpose, a continuous EMG recording was obtained by using bipolar surface electrodes in 4-channel polygraph. (BioDevice,India). Two surface electrodes was placed one over the main bulk of the muscle and other 3 cm above the tendon of the muscle [13]. The point of fatigability was confirmed by the lowest amplitude in the EMG recordings even after the motivation.For assessing handgrip strength, handheld dynamometer was used. The maximum voluntary contraction of the flexor muscles of dominant hand was assessed and the highest value of three reproducible

maneuvers was used in the analysis[14]. It was measured in Kilograms. For statistical analysis the comparison between control and patients were done by using one way ANOVA F- test and comparison between subgroups of patients were assessed by using Bonferroni test.

RESULTS

Table 1- Comparison of different variables between groups using One way ANOVA test

Variable	Group A Normal People n= 30 Mean ± SD	Group B- COPD Patients n = 30			F value	p value
		Mild n = 15 Mean ± SD	Moderate n = 6 Mean ± SD	Severe n = 9 Mean ± SD		
Age (Yrs)	49.77 ± 6.13	50.4 ± 5.32	52.67 ± 6.83	50.78 ± 7.2	0.38	0.76*
Height (cm)	160.37 ± 5.79	160.53 ± 6.58	159.5 ± 6.28	164.44± 4.12	1.32	0.28*
Weight (Kg)	61.03 ± 4.85	61.47 ± 4.86	58.83 ± 6.24	58.33 ± 4.09	1.13	0.34*
Mean FEV1%	93.7	61.4	42.17	29.67	-	-

* Not significant

Table2 Shows multiple comparisons between patient subgroups & control in the Upper limb muscle endurance using Bonferroni test.

Comparison between two groups	Mean Difference	P value
Control vs Mild COPD subgroup	13.24	< 0.001 (HS)*
Control vs Moderate COPD subgroup	15.12	< 0.001 (HS)
Control vs Severe COPD subgroup	15.77	< 0.001 (HS)
Mild COPD subgroup vs Moderate COPD subgroup	1.88	0.126 (NS) #
Mild COPD subgroup vs Severe COPD subgroup	2.53	0.003 (HS)
Moderate COPD subgroup vs Severe COPD subgroup	0.65	1.00 (NS)

- •   HS – Highly significant, # NS – Not significant

Table 3: Shows Forearm muscle strength of control and study groups using

Mosso's ergograph

Groups	N	Mean (kg)	Std. deviation	One way ANOVA F - test
Control	30	4.617	0.6114	F = 28.6 P = 0.001 * (Highly significant)
Mild	15	3.500	0.8452	
Moderate	6	3.083	0.4916	
Severe	9	2.333	0.9014	

Table 4: Shows that upper limb muscle endurance (69%) was more affected than upper limb muscle strength (34%) in COPD patients.

Parameter	Group	N	Mean	Mean of study / mean of control	% of the parameter affected in the study group
Muscle strength (kg)	Control	30	4.61	0.66	34%
	Study	30	3.06		
Muscle endurance (min)	Control	30	20.80	0.31	69%
	Study	30	6.42		

DISCUSSION

The purpose of the study was to compare the upper limb skeletal muscle strength and endurance with severity of COPD patients.

COPD patients have reduced ability to sustain repetitive muscular contractions and that their muscles fatigue rapidly compared to healthy individuals [1]. Easy fatigability of their skeletal muscle is one of the major limiting factors for doing day-to-day activities in patients suffering from COPD.

In the current study it has been found that, upper limb muscle strength was significantly decreased in COPD patients compared to controls. (p = 0.001, highly significant). In the intragroup comparison, it was found that with increase in severity of COPD, there is a decrease in muscle strength. Upper limb muscle strength significantly correlates with FEV1%. This finding correlates well with one of the study which had analyzed the lower limb muscle strength in 50 patients [15]. Also in recent studies showed the lower limb muscle (Quadriceps muscle)strength is decreased in COPD patients [16,17]. According to Bernard et al, there was considerable variability among COPD patients, with some patients having relatively normal values, whereas others had a reduction in lower limb muscle strength of more than 50% [4]. In the current study, upper limb muscle strength was decreased in all COPD patients and they had a reduction in strength of more than 30%. The above data were estimated with Mosso's ergograph. But Bernard et al study sample size was small (n = 16) and in that study only mild COPD patients were included in the study population.

In the current study, Muscle endurance was significantly affected in COPD patients compared to the control group (p = 0.001, highly significant). In the intra group comparison, it was found that with increase in severity of COPD, there

was decrease in muscle endurance. Upper limb muscle endurance significantly correlates with FEV1%. But endurance did not differ significantly between mild & moderate COPD patients as well as moderate & severe COPD patients. This finding correlates well with study in which the lower limb muscle endurance was assessed in COPD patients (n =36) [12]. We found that sensation of fatigue in our patients could be overcome by motivation. They could extend the exercise with motivation. (By about one minute) We also found that muscle endurance is much more affected than the muscle strength.

This study illustrates that normal weight and clinically stable chronic obstructive pulmonary disease patients show a marked impairment in the endurance of the upper limb muscle. This impairment, irrespective of physical activity, is present even in patients with mild-to moderate airflow obstruction. These findings suggest that not only deconditioning, but also other factors related to chronic obstructive pulmonary disease are determinants of muscle endurance.

CONCLUSION

With the above results we conclude saying in COPD patients the upper limb muscle strength and endurance were markedly decreased. Compared to upper limb muscle strength, the upper limb muscle endurance was much more affected in COPD patients. The upper limb muscle strength and endurance were markedly reduced with the increasing severity of COPD.

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

Source of Funding: Self

Ethical Clearance: Obtained

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Effects of Regular Physical Activity on Galvanic Skin Resistance, Cardiovascular Parameters and Perceived Stress levels in Young Adult Females

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ABSTRACT

Present study was carried out on 60 first year MBBS students who were assigned into two Groups-Physical exercise group (n=30) and control group (n=30). Physical exercise group underwent physical activity on bicycle ergometer for 30 minutes daily for 12 weeks. Formative assessments were conducted at 6 weeks (stressor 1) and 12 weeks (stressor 2). Following recordings were taken at the baseline, stressor 1 and stressor 2: Galvanic skin resistance-basal and at the end of 5 minutes of relaxation, Heart rate, Blood pressure(BP), Pulse pressure(PP), Mean arterial blood pressure(MAP),Rate pressure product(RPP), Double product(Do P) and Perceived stress scale(PSS).In our study it was observed that in Physical exercise group there was an increase in GSR(basal) as well as GSR(at the end of 5 minutes of relaxation).There was also a significant decline in resting Heart rate and Blood pressure indices in physical exercise group. There was a significant decrease in PSS score in physical exercise group without any changes being observed in control group. Our study demonstrates that physical exercises are beneficial for the physiological and psychological wellbeing to cope up with the examination stress in medical students.

Keywords: *Physical activity, Galvanic skin resistance, Cardiovascular parameters, Examination Stress*

INTRODUCTION

Modern world is said to be a world of achievements, which is also a world of stress. Right from birth till the last breath, an individual is invariably exposed to various stressful situations. Stress can be defined as an internal state caused by physical demands, by environment or social situations which are potentially harmful, uncontrollable or exceeding our resources to cope up[3]. Stress in medical students is due to competitive education system, parental & peer pressure, change in environment, limitation of coping ability of students etc [1,6,9]. Perceived stress has been reported to be higher for students in health care courses including dental, medical, nursing and graduate health workers[2, 5]. A

student under stress does bring out his/her best but beyond critical limit, "stress" becomes "distress" which can result in stress induced disorders and deteriorating performance[7,8]. If stress is maintained long term behavioral, physiological, emotional, cognitive effects can occur[10]. Previous studies have shown that large increases in blood pressure during psychological stress are at risk for developing essential hypertension in future[12].Stress is also known to modulate the activity of autonomic nervous system to combat stressful situation and get adapted to it[4.] There is need for effective stress reducing intervention that can be self regulated. Regular physical exercise has been characterized as positive health behavior having physiological benefits and enhanced psychological wellbeing[11.] In the present study we have evaluated the effect of 12 weeks of regular physical activity on the physiological parameters

MATERIALS & METHOD

This study is a non-randomized control trial. Prior permission was taken from the institutional ethics

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committee. Lady Hardinge Medical College, New Delhi offers MBBS course only for girl candidates, hence only female subjects in the age group of 18-20 years of age were selected. After meeting the inclusion and exclusion criteria of the study, consecutively consenting 30 MBBS female student volunteers were selected and enrolled into the study and 30 age matched volunteer control subjects were selected and they were grouped as follows:

Group-1(n=30): Subjects who underwent Physical exercise on stationary bicycle.

Group-2(n=30): Healthy Control group.

Inclusion criteria:

• Healthy female subjects in the age group of 18-20 years.

Exclusion criteria:

• Subjects with history of previous or current organic disease

• Subjects who have participated in athletic events in the past one year

Group-1 did physical exercise for 30 minutes daily, six times per week for duration of 12 weeks.

All the subjects were assessed thrice during the study as follows:

1) Initial recordings when there was no examination stressor.

2) At 6 weeks formative assessment examination was conducted and recordings were taken one day before the examination (stressor-1)

3) At 12 weeks formative assessment examination was conducted and recordings were taken just before the examination (stressor-1)

Physical Exercise:

Computerized bicycle Ergometer (ergoline er 900 supplied byJaeger, Germany)

• Stretching exercise for 5 minutes

• Warm up exercise on bicycle for 5 minutes at the initial load of 20 watts followed by exercising at 55-70% of maximum heart rate calculated by formula HR_{max}=220-Age(yrs) for 20 minutes. Cool down exercise for 5 minutes by pedaling at 20 watts.

• Stretching exercise for 5 minutes.

All the subjects (n=60) were asked to present on the day of assessment between 9AM to 11AM at least 2 hours after taking light breakfast. All the subjects were assessed on the following physiological tests:

Galvanic skin resistance:

A small amount of current so small that it cannot be felt is passed across an area of skin. The resistance to the flow decreases i.e conductance increases as the person becomes more aroused and alert. This is called Galvanic skin resistance.

GSR Biofeedback equipment (GBF-2000) was used. Two metal electrodes were tied over the pulp of index finger tips after cleaning with surgical spirit. The basal skin resistance was recorded (kilo-ohms). Then, the subjects were asked to close the eyes and relax. The GSR at the end of 5 minutes of relaxation was recorded again.

Cardiovascular parameters:

After giving 10 minutes of supine rest to the subjects. Brachial systolic (SBP) and Diastolic (DBP) and Heart rate were recorded on a semi-automatic non invasive BP monitor (CitizenCH432B,Japan).

Three BP and Heart rate recordings at 1 min intervals were taken and the lowest of these values was included for the present study. Pulse pressure (PP), Mean Arterial pressure (MAP), Rate pressure product (RPP) and Double product (Do P) were calculated for each recording.

• Pulse Pressure (PP=SBP-DBP)

• Mean Arterial BP(MAP= DBP+PP/3)

• Rate pressure product{HR×SBP}/100

• Double product (Do P=HR×MAP)

Perceived Stress Scale (PSS):

All the subjects were administered PSS. PSS is the most widely used psychological instrument for measuring the perception of stress. The PSS has an internal consistency of 0.85(Cronbach a coefficient) and test –retest reliabililty during a short retest interval (several days) of 0.85. The questions in the PSS are of general nature, relatively free of content specific to any sub-population group and enquire about feelings and thoughts to measure the "degree to which situations in one's life is appraised as 'stressful' especially, over last 1 month. The items are easy to understand and response alternatives are simple to grasp. Items are designed to tap how unpredictable, uncontrollable and overloaded respondents find their lives. It comprised of 10 itmes, four of which are reverse-scored, measured on a 5-point scale from 0 to 4. PSS scores are obtained by reversing responses (e.g. 0=4, 1=3, 2=2, 3=1and 4=0) to the four positively stated items (items4, 5, 7 and 8) and then summing across all scale items. Total score ranges from 0 to 40.

STATISTICAL ANALYSIS

For each group means and standard deviation of the scores were calculated. Normality testing of data was done by Kolmogorov-Smirrnov test. Intergroup mean differences in all parameters were measured by using one way ANOVA .For intragroup comparisons of parameters-paired t- test was used. P value less than 5%(0.05) was considered statistically significant.

RESULTS

Table 1 shows that Baseline values of GSR (Basal) were comparable in Physical exercise and control groups. But GSR recordings at the end of 5 minutes of relaxation were higher at the baseline in Physical exercise group. Our study demonstrates that in Group-1 there was statistically significant increase(p<0.05)in GSR readings in both the basal as well as at the end of 5 minutes of relaxation at 6 weeks(stressor-1) and 12 week(stressor-2) .On the other hand in the control group there was no significant change.

Baseline values of Cardiovascular parameters were comparable in Physical exercise and control groups .It was observed that there was a statistically significant(p<0.05) difference in cardiovascular parameters in physical exercise group at 6wk and 12 weeks. Heart rate and BP (both systolic and diastolic) showed a continuous and significant decline at 6 weeks and 12 weeks. In Pulse pressure (PP) an increase is noted although it was not statistically significant. Mean arterial blood pressure (MAP), Rate pressure product and Double product (Do P) showed a statistically significant decline at 6 and 12 week stressors. While the control groups the recordings of cardiovascular parameters were not significantly different at 6 and 12 weeks. Baseline values of PSS score were comparable in both the groups. It also shows that PSS score in Physical exercise group decreased significantly while there was no change in control group.

Table-1: Comparison of different Parameters without and with examination stressors at 6 weeks and 12 weeks in Physical exercise and control group (Mean±SD) and p Values(*,#)

Parameters	Group	No Stressor (Initial)	Examination Stressor-1 (6 wks)	Examination Stressor-2 (12 wks)
Basal GSR	Physical exercise	282.33±137.89	283.70±140.55	288.93±140.86
	Control	283.67±189.89	280.07±187.27	281.30±188.58
GSR (end of 5 minutes of relaxation)	Physical exercise	454.52±206.44	460.26±206.32***	465.19±206.45###
	Control	361.56±202.24	363.60±201.68**	360.00±203.49
HR (bpm)	Physical exercise	81.85±11.76	78.70±7.69	75.70±6.39#
	Control	79.85±13.09	80.37±10.54	79.96±11.77
SBP(mmHg)	Physical exercise	117.04±4.42	115±6.34	113.41±5.29#
	Control	116.96±3.67	118.19±3.91	117.22±3.32
DBP(mmHg)	Physical exercise	78.29±4.86	76.07±6.31	72.48±5.06###
	Control	77.92±4.16	78.66±3.30	78.37±3.30
PP(mmHg)	Physical exercise	38.74±5.52	39.92±8.28	40.92±7.59
	Control	38.07±5.85	39.51±4.73*	38.85±4.12
MAP(mmHg)	Physical exercise	91.21±2.85	89.05±4.97	86.12±3.69###
	Control	91.58±2.90	91.84±2.72	91.32±2.68
RPP(bpm-mmHg)	Physical exercise	95.77±13.71	90.48±10.96	85.90±9.24#
	Control	93.40±14.63	95.01±12.40	93.65±2.68
DoP(bpm-mmHg)	Physical exercise	7467±1139	7000±842.19*	6521±595.64###
	Control	7316±1181.70	7383±1050.74	7302±1130.68
PSS score	Physical exercise	19.10±4.21	17.50±4.56	15.43±3.24#
	Control	19.50±4.52	19.80±4.32	20.60±5.24

compared with basal value<0.05,**<0.001,***<0.0001, # compared with 6 weeks value#<0.05,##<0.001,###<0.0001

DISCUSSION

In our study at the Baseline, GSR (basal) readings were comparable in both the groups but the readings of GSR relaxation response at the end of 5 minutes were higher in subjects who opted for physical exercise, than in control group. The explanation for that could be that the subjects who preferred doing physical exercise were already more relaxed in the beginning as compared to control group. We also noted significantly higher GSR (at the end of 5 minutes) as compared to Basal readings in both the groups. This finding tells that relaxation with closed eyes even for 5 minutes caused an increase in GSR. In our study there was a statistically significant ($p<0.05$) increase in the GSR (Basal) and GSR (at the end of 5 minutes) in the physical exercise group as compared to the control group. There was a statistically significant increase in GSR (basal) and GSR (at the end of 5 minutes) in Physical exercise group at 6 weeks and at 12 weeks as compared to the control group. This increase in GSR is because regular physical exercise leads to better autonomic tone and HPA axis regulation[24].

Stress responses are triggered through the sympathetic nervous system and hypothalamic pituitary adrenocortical axis(HPA axis).Regular Physical exercise is known to improve the autonomic tone as shown in studies done by Carter JB et al[23] [23.]Our findings are in consensus with their study.

Heart rate, Systolic and Diastolic Blood pressure, Pulse pressure, Mean arterial pressure, RPP ,Do P were also comparable initially in both the group at the baseline. Our study has showed a decrease in Heart rate, Systolic and Diastolic Blood pressure, Rate pressure product and Double product in physical exercise group. While there were not statistically significant decrease in these parameters in control group. Rate pressure product and Double product are a measure of sympathetic activity and are indirect measures of oxygen consumption of heart or work load of heart[14,15,17.].Diastolic blood pressure is a measure of total peripheral resistance (TPR) .It tends to increase with an increase in sympathetic stimulation and decrease with an increase in parasympathetic stimulation. Therefore, there is a decrease in resting sympathetic activity in subjects who did regular physical exercise. Studies done by WL Kenney et al[16], Hounker et al[17] also support our study.

The cause for decreased sympathetic activity as per Studies done by Di Carlo et al has shown that there is Attenuation of arterial baroreflex due to exercise training [19,21,22].

During dynamic exercise there is also stimulation of vascular endothelium with a flow dependent regional vasodilatation mediated by Endothelium derived relaxing factors(EDRF) which decreases the blood pressure[17].

We have noted a decrease in PSS score in Physical exercise group while there was no change in PSS scores of Control group. Improvement of physiological parameters due to better autonomic tone and HPA axis due to chronic exercise is the most likely cause for the improvement of perceived stress level[30]. This is in corroboration with study done by Steven G et al[27].

The neurobiology of exercise e.g release of ß endorphins and enkephalins (happy hormones) and neurotransmitters is also responsible for the sense of well being[28,29]. This has been well studied to be cause of positive addiction to physical exercises[26,31]. Studies done by Steptoe et al[25] also support our findings.

Therefore, our study has shown Long term regular physical exercise has favorable effect on psychological well being and decreases the perceived stress of subjects.

CONCLUSION

Our study demonstrates that there was an increase in autonomic tone and cardiovascular functioning of physical exercise group. This is probably due to the regular physical activity.

We also noted a decrease in PSS in Group -1. Therefore our study shows that Regular physical activity improved the psychological well being of subjects

Limitation of study: It is a non randomized trial and results should be interpreted with potential rater bias. Other forms of physical exercises could not be included.

Conflict of Interest: Nil

Source of Funding: Nil

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A Comparative Study of Neonatal Serum Bilirubin and Certain Haematological Factors in Normal, Induced and Caesarean Section

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ABSTRACT

Aim: To find out the comparison of neonatal serum bilirubin and certain haematological factors in Normal, induced and Caesarean section.

Materials and method: The comparison between the neonatal serum bilirubin and haematological factors is observed in 90 subjects in various (normal, induced & caesarean) neonatals.

Result: Out of the 90 subjects, in induced neonatal serum bilirubin is slightly increases.

Conclusion: It finally concluded as awareness of neonatal serum bilirubin not affect to the induced and caesarean deliveries.

Keywords: *Serum bilirubin, neonatal, hyperbilirubinemia*

INTRODUCTION

Perinatal mortality is a problem of serious dimensions in all countries. It now account for about 90% of all foetal and infant mortality in the developed countries. Approximately 63% of infant death occurs between birth 27 days of life and remainder between 28 days and one year. Main causes of death are intrauterine and birth asphyxia, low birth weight birth trauma and intrauterine or neonatal infection. Prolonged effort time and obstetrics complication also play major role. It can be minimized by timely induction and acceleration of labour by oxytocic drugs or by caesarean section. The most widely used drug that can be used for induction of labour is oxytocin. In 1954 the American biochemist **Vincent du vigeneaud** was the first to describe an octapeptide amide with the hormonal activity of oxytocin. Even after the discovery of prostaglandin, oxytocin is widely used in most of the hospitals for induction of labour in suitable cases

Robert and **waever** (1974) demonstrated increased incidence of hyperbilirubinemia and neonatal jaundice in cases of induced or accelerate labour with oxytocin [1]. **Beazley JM** and **alderman B** (1975) showed a highly significant association between the total dose of oxytocin used for induction and incidence of neonatal hyperbilirubinemia [2]. But in the other hand **Chew WC** and **Swan IL** (1977) **M et al** (1978) and **Oral E et al** (2003) failed to show any significant adverse effects of oxytocic drugs on the foetus in causing increased incidence of hyperbilirubinemia [3,4]. While **Jouppila R et al** (1983) concluded that different anaesthetic agent used during caesarean section have no effect on neonatal hyperbilirubinemia [5]. So, our study was aimed at neonatal serum bilirubin total RBC count and haemoglobin in normal, Induced and caesarean delivery cases to know the level of hypoxia and pharmacological effects of oxytocin and bupivacaine on subsequent neonate.

MATERIALS & METHOD

This study was carried out 90 subjects. And it was measured on 3 various group like spontaneous vaginal delivery (group 1), oxytocin induced delivery (group 2) and elective caesarean section (group 3) were selected from Gynaecology & obstetrics department of our institution, haemolytic disease (Rhesus and ABO incompatibility excluded). New born were observed during their stay in the hospital and also up to the age of five days even they were discharged. And we were used some hematologic equipment's like Haemocytometer kit, microscope for

measuring RBC's count and Sahli's Haemoglobinometer kit for measuring the haemoglobin level. Serum bilirubin, RBC count and Hb levels determined on 1st day, 3rd day & 5th day in neonates.

1st day, cord blood is collected by inserting a needle into the umbilical vein while the placenta still in utero. And 3rd and 5th capillary blood is collected by heel prick after cleaning the skin, it is stabbed with a lancet to a depth of about 2mm, and it should be rotated before being pulled out. In my study serum bilirubin was estimated by modified **Jendrassik & grof** method.

RESULT

In this study, 90 subjects were participated. And according to delivery and segregated into three groups like spontaneous vaginal delivery (group 1), oxytocin induced delivery (group 2) and elective caesarean section (group 3) subjects. It was compared on these subjects if any bilirubin changes or variations existed between these various groups. Finally, I got 30 subjects in each group. And we were measured at 1st, 3rd & 5th days. Finally, we compared RBC, Hb and serum bilirubin levels between in all 3 groups.

Table – 1:- comparative values of neonatal Serum Bilirubin between 3 groups of deliveries.

Day	Groups	Serum Bilirubin in mg/100ml		Standard deviation	't' test	P value
		Range	Mean			
At Birth (or) 1ST DAY	Gp – 1(n=30)	0.74 – 1.46	1.040	0.230	4.667	0.05
	Gp – 2(n=30)	0.90 – 1.62	1.328	0.248		
	Gp – 1(n=30)	0.74 – 1.46	1.040	0.230	1.1215	0.05
	Gp – 3(n=30)	0.63 – 1.24	0.980	0.182		
	Gp – 2(n=30)	0.90 – 1.62	1.328	0.248	6.196	0.05
	Gp – 3(n=30)	0.63 – 1.24	0.980	0.182		
3rd DAY	Gp – 1(n=30)	3.16 – 4.93	3.806	0.586	6.300	0.05
	Gp – 2(n=30)	3.92 – 5.36	4.829	0.412		
	Gp – 1(n=30)	3.16 – 4.93	3.806	0.586	2.405	0.05
	Gp – 3(n=30)	3.46 – 4.60	4.148	0.341		
	Gp – 2(n=30)	3.92 – 5.36	4.829	0.412	5.78	0.05
	Gp – 3(n=30)	3.46 – 4.60	4.148	0.341		
5th DAY	Gp – 1(n=30)	2.86 – 4.28	3.632	0.495	4.240	0.05
	Gp – 2(n=30)	3.64 – 4.72	4.275	0.308		
	Gp – 1(n=30)	2.86 – 4.28	3.632	0.495	2.32	0.05
	Gp – 3(n=30)	3.21 – 4.50	3.950	0.363		
	Gp – 2(n=30)	3.64 – 4.72	4.275	0.308	2.807	0.05
	Gp – 3(n=30)	3.21 – 4.50	3.950	0.363		

It is significant to note that the serum bilirubin level had a rising tendency up to the 3rd day and had a falling tendency afterwards but the none reached to the previous normal level on the 5th day. (Table – 1)

Table – 2:- comparative values of RBC count in million/mm³ between 3 groups of deliveries.

Day	Groups	RBC count in million/mm³		Standard deviation	't' test	P value
		Range	Mean			
At birth (or) 1ST DAY	Gp – 1(n=30)	5.4 – 6.5	5.927	0.378		
	Gp – 2(n=30)	5.5 – 6.6	6.203	0.331	3.0098	0.05
	Gp – 1(n=30)	5.4 – 6.5	5.927	0.378		
	Gp – 3(n=30)	4.5 – 6.1	5.417	0.487	4.568	0.05
	Gp – 2(n=30)	5.5 – 6.6	6.203	0.331		
	Gp – 3(n=30)	4.5 – 6.1	5.413	0.487	7.350	0.05
3rd DAY	Gp – 1(n=30)	5.3 – 6.5	5.914	0.383		
	Gp – 2(n=30)	5.4 – 6.4	6.100	0.318	1.636	0.05
	Gp – 1(n=30)	5.3 – 6.5	5.914	0.383		
	Gp – 3(n=30)	4.5 – 6.1	5.353	0.473	4.669	0.05
	Gp – 2(n=30)	5.4 – 6.4	6.100	0.318		
	Gp – 3(n=30)	4.5 – 6.1	5.353	0.473	6.456	0.05
5th DAY	Gp – 1(n=30)	5.3 – 6.4	5.847	0.382		
	Gp – 2(n=30)	5.7 – 6.4	6.082	0.225	2.047	0.05
	Gp – 1(n=30)	5.3 – 6.4	5.847	0.382		
	Gp – 3(n=30)	4.20 – 6.0	5.26	0.500	4.515	0.05
	Gp – 2(n=30)	5.7 – 6.4	6.082	0.225		
	Gp – 3(n=30)	4.2 – 6.0	5.26	0.500	7.229	0.05

It is significant to note that serum bilirubin level on the 3rd day has gone up about 3 times from the value at birth and declined on 5th day but still remained high than that of the birth value. (Table – 2).

Table – 3:- Comparative values of Haemoglobin between 3 groups of deliveries.

Day	Groups	Haemoglobin in gm/100 ml		Standard deviation	't' test	P value
		Range	Mean			
At Birth (or) 1ST DAY	Gp – 1(n=30)	15.7 – 17.5	16.690	0.721		
	Gp – 2(n=30)	16.1 – 18.2	17.310	0.621	3.568	0.05
	Gp – 1(n=30)	15.6 – 17.9	16.690	0.721		
	Gp – 3(n=30)	15.1 – 17.3	16.200	0.557	2.946	0.05
	Gp – 2(n=30)	16.1 – 18.2	17.310	0.621		
	Gp – 3(n=30)	15.1 – 17.3	16.200	0.557	7.288	0.05
3rd DAY	Gp – 1(n=30)	14.9 – 17.8	16.490	0.8126		
	Gp – 2(n=30)	15.8 – 17.7	16.935	0.567	1.1983	0.05
	Gp – 1(n=30)	14.9 – 17.8	16.490	0.8126		
	Gp – 3(n=30)	14.9 – 17.2	15.98	0.567	2.479	0.05
	Gp – 2(n=30)	15.8 – 17.7	16.935	0.567		
	Gp – 3(n=30)	14.9 – 17.2	15.98	0.571	5.536	0.05
5th DAY	Gp – 1(n=30)	14.7 – 17.4	16.290	0.859		
	Gp – 2(n=30)	16.1 – 17.6	16.780	0.522	1.876	0.05
	Gp – 1(n=30)	14.7 – 17.4	16.290	0.859		
	Gp – 3(n=30)	14.5 – 16.9	15.800	0.576	2.1003	0.05
	Gp – 2(n=30)	16.1 – 17.6	16.780	0.522		
	Gp – 3(n=30)	14.5 – 16.9	15.800	0.576	5.177	0.05

On comparison of the mean serum bilirubin level of the 3rd day, the mean value of caesarean delivery group is slightly higher (4.148) than that of the normal delivery group (3.806). The difference between the mean of two groups is statistically significant with a 't' value of 2.90 and 'p' value of 0.05.

In normal delivery, it is significant to note that the serum bilirubin level had a rising tendency up to the 3rd day and had a falling tendency afterwards but none reached to the previous normal level on the 5th day (Table – 1). At birth, the serum bilirubin of different authors in between 0.74 and 2.507mg/100ml. in other hand of induced delivery also showed as significant (Table – 2). And finally, in caesarean delivery value slightly increased

DISCUSSION

Neonatal jaundice is the commonest abnormal physiological finding during first week of life. Increase in the incidence of jaundice might be due to an increase in the use of oxytocic drugs in the management of labour **Ghosh and Hudson, 1972** [6]. Infants born following spinal block with bupivacaine have also increase risk of jaundice.

On the 5th day, the serum bilirubin level of different author ranged between 4.3 and 6.3 mg/100ml. the serum bilirubin level on the 5th day of the study is 3.632mg.100ml. **Nelson (1998) and Gupta (1977)** also stated that the serum bilirubin level in full term infants settle down by the end of the first week[7].

The bilirubin level of the 3rd and 5th day of the present series is slightly lower with that of the author's work. This may be due to difference in body built, dietary habits of mother, environment and type of feeding etc... **Davies (1964)** suggested that infants who are fed late or inadequately in the first few days have higher serum bilirubin level than those fed early and adequately [8]. **Dennery PA, Seidman DS, Stevenson DK (2001)**, stated that infants that fail to feed well are often deficient in the types of intestinal bacteria that metabolise bilirubin and in such cases, significant amount of bilirubin are reabsorbed into blood [9]. In most of the cases in this institution, feeding is started within six hours and this may be one of the factors which results in lowering the serum bilirubin level.

It is significant to note that serum bilirubin level on the 3rd day has gone up about 3 times from the value at birth and declined on 5th day but still remained high than that of the birth value.

The mean serum bilirubin level in induced group at birth as reported by different workers (e.g. **Davies et al, 1973; Davidson, 1973; Gray & Mitchell, 1974; Bearley & Alderman, 1975; Thiery et al, 1975; Chew and Swann, 1977; Sivasuriya et al, 1978)**, lies between 0.51 to2.71mg/100ml. The mean serum bilirubin level of the present work is within the range of reports of different workers. The mean serum bilirubin level on the 3rd day of present work ranged between 4.829mg /100ml whereas reports of different workers of the 3rd day lie between 6.17 – 8.73mg/100ml. This shows slight decreased value of the present work with that of the other lie between 3.45 – 7.0mg/100ml, whereas the mean level of the 5th day of the present work is 4.275mg/100ml which is slightly lower in comparison to other workers. [8,10,11,3,12]

CONCLUSION

In total 90 neonates were investigated for serum bilirubin, total RBC count and haemoglobin concentration. Out of these 30 cases were of normal delivery group, 30 cases of induced delivery group 30 cases of caesarean delivery group. In each case serum bilirubin, total RBC count and haemoglobin concentration was estimated at birth, on 3rd day and on 5th day.

In normal delivery group, the above investigation were done in all the 30 cases at birth, however only 21 cases on the 3rd day and 17 cases on the 5th day could be examined because of the early discharge of the cases from the hospital.

In this study only a mild rise in values were noticed in induced delivery group. There is no specific change in neonatal serum bilirubin, total RBC count and haemoglobin concentration in induced delivery and caesarean delivery cases. The hyperbilirubinemia found is transient.

It can be concluded that there is no danger of hyperbilirubinemia in neonates born by oxytocin induced delivery as well as infants born following spinal block with bupivacaine.

Conflict of Interest: - Nil

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Severity of Diabetic Retinopathy and the Associated Risk Factors in Type 2 Diabetes Mellitus

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ABSTRACT

Diabetes is a major cause of adult-onset blindness.[1] Nearly 25% of all diabetics have some form of Diabetic Retinopathy. Patients that are taken into this study are patients diagnosed with type2 diabetes, but on irregular control and those undiagnosed coming for routine checkup. Aim of this study is to see whether there is any increase in the severity of Diabetic Retinopathy in type 2 Diabetes mellitus with chronic untreated risk factors and correlation with various risk factors like, age of onset,duration of diabetes, dyslipidemia, elevated HbA1c and DR. 100 patients of type 2 diabetes mellitus randomly selected were included in this study. All patients were subjected to clinical and biochemical examination. Fundus examination is a critical step in the diagnosis of DR . Visualization of retina by direct and indirect ophthalmoscopy, fluorescein angiography is valuable in type2 DM patients to rule out preexisting retinal pathology.

Conclusion: The mainstay in the treatment of diabetic maculopathy and proliferative retinopathy is Laser Photocoagulation with maximum benefit seen in patients treated early. Screening type2 diabetes patients with HbA1c and ophthalmic examination in chronic and irregularly controlled diabetes helps in detecting DR in the early stages and prevent further damage.

Keywords : *DR, NPDR,PDR, type2DM,AGEs.*

INTRODUCTION

Diabetes is fast assuming epidemic proportions in our country.Diabetes has far-reaching effects on almost all essential organs of the body. Every person with diabetes is 25 times more prone to visual handicap and legal blindness[1]. In the long-standing diabetes microvascular and macrovascular complications occur. One of the microvasacular abnormalities is DR.

Patients that are taken into this study are patients diagnosed with type2 diabetes, but on irregular control and those undiagnosed coming for routine checkup.

The advent of HbA1c provides reliable measurement of duration of hyperglycemia.

But there are some difficulties regarding HbA1c test , cost of the test and it is not one of the screening tests of diabetes.

Fundus examination is a critical step in the diagnosis of DR . Visualization of retina by direct and indirect ophthalmoscopy, fluorescein angiography is valuable in type2 DM patients to rule out preexisting retinal pathology.

The mainstay in the treatment of diabetic maculopathy and proliferative retinopathy is **Laser Photocoagulation** with maximum benefit seen in patients treated early.

Previous studies shown by DRS and ETDRS clearly indicate that laser treatment decreases the risk of severe visual loss and moderate visual loss in diabetic retinopathy.

Facilities such as fluorescein angiography, fundus photography, and modalities of advanced management of proliferative diabetic retinopathy, should be available, of National Diabetes Control Programme (NDCP).

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In this study it is observed that including HbA1c in screening of diabetes and ophthalmic examination for those with history of chronic and irregularly controlled diabetes can be recommended strongly.

Aim of the study is to create awareness with regard to changing pattern of utilization of diagnostic modalities for diabetes and its complications not only among general public but also medical practicers and other specialities.

The need for collaboration between ophthalmologists and diabetologists are well emphasized for detection of ophthalmic manifestations in type2 diabetes even at tertiary center to enhance quality of diabetic cum ophthalmic care.

BACKGROUND

Risk Factors:

Degree of hyperglycemia

FBG < 120 mg% and PP blood glucose < 150 mg% as criteria of good control. With the availability of HbA_{1c}, studies confirmed the relationship between level of HbA_{1c} and prevalence of retinopathy with threshold value of HbA_{1c} between 8 and 8.5%[13].

Lowering of HbA_{1c} by 2 % reduced significantly the risk both for the development (primary prevention) and for the progression of diabetic retinopathy (secondary prevention).

Glycated Hemoglobin (HbA₁C)

Glycated hemoglobin levels are highly correlated to adverse clinical outcomes (e.g. retinopathy) The specimen can be collected without regard to when the patient last ate.

Dyslipidemia and Retinopathy:

Elevated serum cholesterol > 6.2 mmol/L increased the risk of visual loss by 50% compared with a low serum cholesterol level < 6.21 mmol/L[3].

Patients with total serum cholesterol = 6.21 mmol/L or triglycerides > 4.50 mmol/L developed hard exudates approximately 50% faster than patients with serum cholesterol < 5.17 and triglycerides < 2.3 mmol/L[5].

Elevated BP

There was a continuum observed in the relationship between the risk of diabetic retinopathy and systolic blood pressure (> 130 mmHg) in the UKPDS [8]

In both types of diabetes, elevated diastolic blood pressure was a risk factor for macular edema [8].

Tight control of blood pressure reduces morbidity and mortality in people with Type2 DM[11].

Vascular Biology and Diabetic Retinopathy

Enhanced flux through sorbitol pathway[7], myoinositol depletion, increased expression of (VEGF), (VPF) and (TGF α), as well as decreased NA^+-K^+-ATPase activity,enhanced (AGEs), increased (ROS), and activation of protein kinase C (PKC).

PKC in the pathogenesis of glucotoxicity[4]

Activation of PKC by diacylglycerol, AGEs and ROS

The proteins of extracellular matrix (ECM) and vascular basement membrane (BM) are highly susceptible to AGE modifications. AGEs are localized in the retinal vessels and retinal pericytes. Occupation of receptors for AGEs by enhanced production of AGEs   increases diacylglycerol production and activates PKC [10].

Endothelial Dysfunction

Diabetes is associated with attenuated endothelium-dependent vasodilation. Patients with Type 2 diabetes have impaired vasodilation to both endogenous and exogenous NO[14].

Activated PKC, reduces NO activity by decreasing transcription of endothelial cell NO synthase.

Vascular Na^+-K^+-ATPase activity is reduced in diabetes[15]. PKC β activation has been postulated to mediate hyperglycemia-induced decreases in Na^+-K^+-ATPase activity [15].

Clinicopathological correlates

Visual loss in diabetes is attributed to diabetic macular edema and PDR. Hyperglycemia-induced activation of PKC β increases phosphorylation of connexin-43 and disruption of gap junctional intercellular communication in cultured vascular smooth muscle cells[7] that would lead to enhanced vascular permeability and macular edema.

VEGF/ VPF is a potent cytokine that enhances

vascular leakage. VEGF/VPF is only marginally increased in non-proliferative retinopathy[1]. VEGF/VPF stimulates endothelial cell proliferation and neovascularization. Elevation of VEGF/VPF in patients with PDR suggest the involvement of this cytokine in neovascularization[1].

AIM OF STUDY

To study the severity of Diabetic Retinopathy and their associated risk factors in type 2 Diabetes mellitus and its correlation with various risk factors, age of onset, duration of diabetes, other complications of diabetes, dyslipidemia, HbA1c.

MATERIAL AND METHOD

100 patients of type 2 diabetes mellitus randomly selected were included in this study. All patients were subjected to clinical and biochemical examination.

Direct ophthalmoscopic examination

30^0 non stereoscopic retinal photographs. Retinopathy was classified by ETDRS (Early Treatment Diabetic Retinopathy Study). The study group was divided into

Group A with retinopathy

Group B without retinopathy.

Statistical analysis was done by chi – square (X^2) and P value.

The main aim of the study is to see whether there is any increase in severity of retinopathy in type 2 diabetes mellitus subjects with chronic , untreated risk factors.

The evaluation of parameters chosen for this study clearly indicates that the early detection and control of these risk factors is essential for prevention of DR .

Optimal metabolic control of all risk factors should be an important treatment goal and should be implemented early and maintained.

Table 1.Age of onset of diabetes

Age	DR+	DR-
35-55	20	29
55-75	22	28

Chi square   0.06, P> 0.05   not significant

Table 2.Duration of diabetes

Duration	DR+	DR-
5-15 yrs	22	4

Chi square   22.58, P<   0.0000002   Significant

Table 3. Fasting blood sugar levels

FBS	DR+	DR-
70-99	2	29
>99	41	28

Chi squre   22.37, P< 0.000001   Significant

Table 4. Glycemic control

HlbA1c	DR+	DR-
<7%	1	41
>7%	31	27

Chi square   26.9, P< 0.000002   significant

Table 5. Serum lipids

Choleste	DR+	DR-
150-200	6	48
>200	29	17

Chi square   27.21, P< 0.0000002   Significant

In table 2. DR in the group with diabetes of 15-25 years is significant.

In table 3.   Mean FBS levels in subjects with retinopathy is 128.4mg/dl with a p<0.000001

In table 4. Out of 58 subjects with >7% HbA1c , 31 show retinopathy changes

RESULTS

In this study of 100 people 62% 35-55 yrs, out of this 32% showed retinopathy changes,

38% 55-75 yrs out of this 57% showed retinopathy changes.

Average age of patients at the time of presentation with retinopathy was 55.82 years without retinopathy 47.68 years

In this study the average duration of diabetes with retinopathy was 11.17 years with a range of 5-25years.

All the subjects with retinopathy (39 patients) were

grouped into NPDR (31 patients)

PDR (8 patients)

On comparing the biochemical and clinical findings in the study group the mean age in PDR is 64.88years, mean age in NPDR is 55.82 years.

The FBS, RBS, Post lunch glucose levels are elevated in both groups, the values are more in proliferative retinopathy.

Mean HbA1c is **9.788% in PDR** compared to **8.9% in NPDR** showing relationship of poor glycemic control to severity of retinopathy.

Mean FBS level in subjects without retinopathy is 101.5mg/dl with retinopathy is 128.4mg/dl and p<0.000001 which is significant.

In the people with >200mg/dl of serum cholesterol more than 50% showed retinopathy Mean HbA1c in subjects with retinopathy is 8.895% 32 subjects out of 39 showed >7% HbA1c . P<0.000002 which is significant.

DISCUSSION

Diabetic retinopathy is often asymptomatic in its most treatable stages. Early detection through regular scheduled ocular examination is critical. Retinopathy is a serious complication of diabetes mellitus and detection of risk factors early is the goal.

This study was undertaken to study the effect of risk factors on severity of retinopathy in type 2 diabetes mellitus patients.

All the parameters of subjects with retinopathy were compared with those of control group. Comparing the duration of diabetes to clinically significant retinopathy in the 100 subjects

21 in the group of 5-15 years duration of diabetes mellitus

22 in the group of 15-25 years duration are having changes of retinopathy.

The duration of diabetes is probably the strongest predictor for development and progression of retinopathy.

100 cases of type 2 diabetes mellitus patients were studied. All were between the age group of 35-75 and were subjected to biochemical analysis and clinical examination.

Evaluation was made by determining their age at the first diagnosis of diabetes , duration of diabetes , BMI, blood pressure, fasting and post lunch blood glucose levels, blood urea, seum creatinine, lipid profile (serum ch olesterol,HDL,LDL,VLDL,triglycerides,) and examination of the fundus by direct ophthalmoscopy and indirect ophthalmoscopy and fundus photography.

Lipoprotein(a) is believed to play an important role in the development and progression of retinopathy.

The multifactorial control of diabetes such as HbA1c, BP, lipid profile, anemia and 24 hour proteinuria, even before laser photocoagulation can lead to reduction in progression of non proliferative diabetic retinopathy (NPDR) and clinically significant macular edema (CSME) to blinding proliferative diabetic retinopathy (PDR) and its complications like vitreous hemorrhage and tractional retinal detachment and a trend towards improvement in visual acuity.

CONCLUSION

The main aim of the study is to find whether there is any increase in severity of retinopathy in type2 diabetes patients with risk factors, compared to those without significant risk factors and to prevent visual loss by early detection of risk factors.

Present study is hospital based randomized case control study.

Total 100 type2 diabetic patients were selected for biochemical and clinical tests and examined by fundoscopy after full pupillary dilatation.

A total of **61** subjects were classified as having no diabetic retinopathy .

No. of patients found to be having Retinopathy **39,** NPDR -**31 ,** PDR -**08.**

Duration of diabetes 5-15 yrs vs 15-25 yrs , **P<0.0000002**

Glycemic control 70-99/dl vs >99md/dl with **P<0,000001**

HbA1c <7% vs >7%, **P<0.000002**

Serum lipids 150-200mg/dl vs >200mg/dl, **P<0.0000002.**

Glycemic control, increased HbA1c ,Serum lipids are significant risk factors in type2 diabetes patients with retinopathy.

The ultimate cause of microvascular complications is **chronic hyperglycemia** and tight control of reduces their incidence.

Therefore it is timely to deliberate upon this theme so

as not only to create awareness among public and health planners, but also to educate primary care physicians, internists diabetologists and ophthalmologists with the aim of enhancing quality of diabetes cum ophthalmic care.

Conflict of Interest: No Conflict of interest.

Source of support: Self

Ethical Clearance: Obtained from Ethical Committee of DR NTR UHSVijayawada, Andhra Pradesh.

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Prevalence of Helicobacter Pylori in Symptomatic Adult Patients in a Tertiary Care Hospital: A Cross Sectional Study

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ABSTRACT

Helicobacter pylori are well recognized as major cause of gastro-intestinal diseases. The present cross - sectional study was done in the department of Medicine at G.S.V.M Medical College. A total of 194 adult patients attending outpatient department for various gastrointestinal symptoms were screened to find out the prevalence of Helicobacter pylori using Stool antigen card test. Out of these 194 patients, 98 were found positive for Helicobacter pylori by the test, giving a prevalence of 50.51%. A detailed proforma was filled, regarding the age and sex of the patient, education and occupation of the head of the family, sanitary practices, dietary habits and tobacco chewing. The patients were also examined for pallor. Among a total of 126 males, 69 were found positive for Helicobacter pylori (54.8%) and among 68 females, 29 were found positive (42.6%). Age wise distribution showed maximum prevalence of Helicobacter pylori in the age group of 40-49 years (59.6%) and minimum in the age group of more than 70 years. A higher prevalence of Helicobacter pylori was found among non-vegetarians (61.1%) and among patients having pallor (62.3%) and both were significant. The study of socio-economic status showed a prevalence of 55.4% in upper lower, 46.2% in lower middle and 40% in upper middle socio-economic groups. A prevalence of 51.7% was seen among subjects chewing tobacco and 64.7% in smokers.

Keywords: H. pylori, stool antigen card test, pallor, tobacco.

INTRODUCTION

Helicobacter pylori, formerly known as *Campylobacter pylori* is a gram negative, curved, microphilic and motile the world's population [1]. There is substantial evidence that it causes chronic gastritis, peptic ulcers, and duodenal ulcers and is also involved in the development of gastric carcinoma [2-4]. Once acquired, *Helicobacter pylori* infection generally persists throughout life, unless treated by specific antimicrobial therapy [5]. It has been demonstrated that housefly has the potential to transmit *Helicobacter pylori* mechanically [6] and thus poor sanitation may potentiate

its spread. Person to person contact is considered to be the most likely transmission route. Another important mode of transmission is iatrogenic in which tubes or endoscopes that have been in contact with gastric mucosa of one individual are used for another patient [7]. Another possible route is orofecal and *Helicobacter pylori* have been isolated from faeces of infected young children [5]. There are also studies investigating the association between the seroprevalence of *Helicobacter pylori* and Hepatitis A virus [8-13]. Water contaminated with faeces may be a major source of infection as is consumption of uncooked vegetables irrigated with water contaminated with seropositivity [14]. Various socio-economic conditions comprising of high density crowding, poor sanitary practices, family income, educational level and occupation [15-17] have been held responsible in spreading of the pathogen. Early detection of *Helicobacter pylori* population and its eradication may

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result in significant improvement in severity of dyspeptic symptoms. It is important to find out *Helicobacter pylori* prevalence and identify high-risk population so that treatment strategies can be appropriately planned.

The present hospital-based cross-sectional study was done on patients attending OPD for various gastro-intestinal disorders and the prevalence of *Helicobacter pylori* was estimated. Other parameters like socio-economic status according to Kuppuswamy grading, age, sex, diet, pallor, smoking and tobacco consumption were also studied and association of *Helicobacter pylori* if any, was identified.

MATERIAL AND METHOD

The study was conducted in the department of Medicine at GSVM Medical College, Kanpur in collaboration with department of Physiology at KGMU, Lucknow during 2012-2013. A total of 194 patients of both sexes attending OPD for various symptoms of gastrointestinal disorders were screened for *Helicobacter pylori* .Written informed consent was taken from all the patients after explaining to them the nature and purpose of study. Ethical clearance was taken prior to the study from the ethical committee. Patients who had taken proton pump inhibitors or antibiotic for a month prior to study were excluded. Patients' stools samples were collected in airtight containers and stool assay was performed using Immunocard STAT HpSA test. (Standard diagnostics Inc).

The test device and the sample were brought to room temperature prior to testing. The test device was laid on a flat dry surface and about three drops of the prepared sample were poured into the sample well. Interpretation was done after fifteen minutes. Two colour bands, one at test band and another at control band indicated a positive result. Negative test results showed only control band.

STATISTICAL ANALYSIS

Data were analysed by the chi-square test to compare the association between different variables and positive *Helicobacter pylori* rates. A value of *P* <0.05 was considered statistically significant. Calculations were done using the software package SPSS 16.0.

RESULTS

Out of total 194 patients, 98 patients were *Helicobacter pylori* positive by Immunocard STAT HpSA test, giving a hospital based prevalence of 50.51% (Table1). Out of total 126 males, 69 were positive for *Helicobacter pylori*

(54.8%) whereas out of 68 females 29 were positive (42.6%) (Table2). The prevalence was estimated in different age groups. The maximum number of positive patients was found in the age group of 40-49 years (59.6%) and the minimum prevalence was in the age group of above 70 years (Table3). For socio economic status, the groups were classified according to modified Kuppuswamy scale for urban families. Out of 92 patients belonging to upper lower socioeconomic group, 51 were positive for *Helicobacter pylori* (55.4%), out of 91 of lower middle group, 42 were positive (46.2%) and out of 10 of upper middle group ,4 were positive (40%)(Table4). Prevalence of Helicobacter pylori among vegetarians and non- vegetarians were 40.4% and 61.1% respectively(Table5).Pallor was present in total 77 patients with 48 positive (62.3%) which was significant (Table 6). Out of 50 tobacco-chewing subjects, 33 were positive for *Helicobacter pylori*, *which* indicated a prevalence of 66% (Table 7) and out of 51 subjects who were smokers, 33 were positive for *Helicobacter pylori* giving a prevalence of 64.7%(Table 8).

Table 1:- Prevalence of H.pylori

Total subjects	194
Subjects positive with H.pylori card test	98

Prevalence of H.pylori == 98/194 X 100 =50.51 %

Table 2:- Number of H.pylori positive patients according to sex

Sex	Total subjects	subjects positive for H.pylori	Percentage %
Male	126	69	54.8%
Female	68	29	42.6%

Table 3:- Number of H.pylori positive patients according to age group

sage group(years)	Total subjects	No. of positive patients	Percentage %
19-29	62	27	43.5 %
30-39	52	26	50.0 %
40-49	47	28	59.6 %
50-59	25	14	56.0%
60-69	6	3	50.0%
>70	2	0	00%

Table 4:- Number of H.pylori positive patients according to socio economic status

SE status	Total subjects	No. of positive patients	Percentage %
Upper lower	92	51	55.4 %
Lower middle	91	42	46.2 %
Upper middle	10	4	40.0 %

Table 5- Number of H.pylori positive patients according to diet

Type of diet	Total subjects	No. of positive patients	Percentage %
Vegetarian	99	40	40.4%
Non-Vegetarian	95	58	61.1%

Table 6- Number of H.pylori positive patients according to pallor

Pallor	Total subjects	No. of positive patients	Percentage %
Present	77	48	62.3 %
Absent	117	50	42.7 %

Table 7- Number of H.pylori positive patients according to tobacco chewing

Tobacco	Total subjects	No. of positive patients	Percentage %
Chewer	50	33	66.0%
Non-chewer	144	65	45.1%

Table 8- Number of H.pylori positive patients according to smoking

Smoking	Total subjects	No. of positive patients	Percentage %
Smokers	51	33	64.7%
Non-smokers	143	65	45.5%

DISCUSSION

The prevalence of *Helicobacter pylori* infection varies worldwide, but higher colonization rates have been seen in developing countries, compared to developed countries. This study was conducted to find out the prevalence of H.pylori among patients attending OPD for various gastrointestinal symptoms. These patients were screened for *Helicobacter pylori* by Immunocard STAT HpSA test. In a study from Jammu, 265 symptomatic patients of acid peptic disease were screened for *Helicobacter pylori*, out of which 92 were positive giving a prevalence of 34.71% [18]. The overall prevalence recorded in our study was 50.51%, which is higher in comparison to the above study. This can be explained by the fact that prevalence of H.pylori varies widely by geographic area, age, race, and ethnicity and SE status. In another study from Chandigarh on 254 symptomatic patients, *Helicobacter pylori* prevalence was found to be 61.30% [19]. This demonstrated a frequent occurrence of *Helicobacter pylori in that part of country.* In the present study, among *Helicobacter pylori* positive patients 54.8% were males and 42.6% were females. Although there is slightly greater male preponderance but the difference between the genders was not significant which goes in accordance with a similar study from Jammu [18]. In the present study, age wise distribution showed maximum prevalence in the age group of 40-49 years (59.6%) and minimum in the age group of more than 70 years. This goes in accordance with a similar Indian study in which the maximum prevalence was in the age group of 36-45 years (43.47%) and minimum in the age group of 66-75 years (3.26%) [21]. A male-female ratio of 1.44 and mean age of 53 years was recorded in a study from north eastern Mexico [20], whereas in an Indian study [21], age related prevalence in the age group of 20-29 years, 30-39 years, 40-49 years and >50 years were 52%, 70% 69%, 60% and 59% respectively.

In the present study, out of 77 patients having pallor 48 patients were positive for H. pylori (62.3%). *Helicobacter pylori* colonization appears to impair iron uptake and increase iron loss. Regarding the possible role of *Helicobacter pylori* in iron deficiency anaemia, a recent met analysis indicated that the infection is associated with depleted iron deposits. The mechanism by which *Helicobacter pylori* induces this alteration is not clear but it appears to involve GI blood loss, diminished iron absorption from diet and increased consumption of iron by the bacteria [22]. A study with *Helicobacter pylori* infected patients from Bangladesh has shown the prevalence of iron deficiency anaemia with a decrease in haemoglobin while serum ferritin was significantly higher in H.pylori infected patients [23]. The prevalence of *Helicobacter pylori* in our

study was found to be higher in low socioeconomic group being 55.4% in upper lower and 46.2% in lower middle groups. This is consistent with previous studies which have demonstrated that the prevalence of *Helicobacter pylori* as well as gastritis is more frequent in those who come from large families, have poor hygiene, low standards of living, poor sanitation practices and overcrowded living conditions [24-26]. Socioeconomic status is not restricted to income and social class but also considers other factors such as living standards, urbanization and educational level [27]. Similar result was seen in a study among professional workers of Kashmir valley [28]. A prevalence of 40.4% was seen in vegetarians and 61.1% in non-vegetarian group, which was higher in non-vegetarians and significant (p<0.05). This supports the fact that the food prepared under unhygienic conditions and the type of food consumed plays a role in transmission of *Helicobacter pylori* in developing countries [29]. Similarly, the prevalence of *Helicobacter pylori* among tobacco chewers was higher (66%) than among non-tobacco chewers (45.1%) and also, the prevalence of *Helicobacter pylori* among smokers was higher (64.7%) than among non-smokers (45.5%) and both were significant (p<0.05). The non vegetarian diet, tobacco chewing and smoking have been studied as risk factors for peptic ulcer and gastric cancer among *Helicobacter pylori* infected individuals [30-32] but still more studies are required to establish an association between them.

CONCLUSION

The present study revealed substantial prevalence of *Helicobacter pylori* in symptomatic patients with males being more affected than females and a maximum prevalence in the age group of 30-39 years. The prevalence is higher in low socioeconomic classes with poor sanitation practices and unhygienic water supply. A higher prevalence of *Helicobacter pylori* seen in subjects having pallor may be contributed to poor iron absorption. Similarly, a higher prevalence of *Helicobacter pylori* was noticed among non-vegetarians, smokers and tobacco consumers, which may be the contributing factors in the development of peptic ulcer and gastric cancer in patients harboring *Helicobacter pylori*.

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Re-introduction of Multiple Choice Questions-
A Feedback from First Year MBBS Students

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ABSTRACT

Assessment, evaluation goes by side of teaching. Multiple choice questions (MCQ's) assess the cognitive domain which was included in summative assessment earlier. Today The Tamilnadu Medical University designed the question paper which contains Essay, Detail notes, Short answers exempting MCQ's. This project was done to get a feed back from students for reintroducing MCQ's in present examination pattern. As already students were exposed to long essays in their routine Formative assessments, we planned to give them the MCQ's. The MCQ's of single best answer type were given from the previous lecture classes. At the end of few such sessions, students were given feedback form to fill and forms were analysed further. As per the feedback from the students, it showed that they wish to have MCQ's as it not only increases their learning skills, concepts but also shows an improvement in the final summative assessments.

Keywords: *Essay, Multiple choice questions, feedback.*

INTRODUCTION

Assessment and evaluation are the part of teaching methodology[1]. Assessment and evaluation are continuous process and should go along with the curriculum development[2]. We assess and evaluate our students by formative and summative assessment respectively. Formative assessments are either informed or uninformed test given by the teachers not only to modify their teaching methods but also to improve learning by the students[3]. The summative assessments   evaluate students' learning at the end of the curriculum year, in MBBS course this is practised by providing them written and practical examinations. Summative assessments have got its high point value [4].

The Tamilnadu Dr.MGR Medical University, Tamilnadu presently designed the question paper which contains Essay, Detail notes, Short answers only. The Multiple choice questions which had been part of written examination earlier, had been excluded from the present university question paper. In the past,   the 30 MCQ's carrying 30 marks for half an hour duration in the beginning of the every written examination followed by essay for 20 marks and short notes for 50 marks were provided.

There are three domains of educational activities and learning such as cognitive (Knowledge) domain, affective (attitiude) domain, psychomotor (Skills)domain[5]. In any examination it is necessary to assess these three domains. Hence we   wanted to reintroduce MCQ's as part of examination to assess the cognitive domain in the students.

There are various types of MCQ's in objective testing - they are one best response type, K-type MCQ, Matching type, Relationship analysis type, Case history type, Pictorial type, Multiple independent true-false selection type[6]. In our study we opted for single best response type of MCQ's.

This project was done to get a feed back from students regarding reintroducing MCQ's in our present examination pattern as it was earlier.

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MATERIALS & METHOD

This study was carried out during the physiology lecture classes with 153 students of I MBBS of KAPV Government Medical College, Tiruchirapalli. MCQs in the topic lectured, were given to the students after Physiology lecture classes as part of formative assessment. The students were given about 5 Multiple choice questions for five minutes, of single best answer type. The MCQ's test paper were collected and corrected to assess the students understanding. Most of them had done well which shows that they had understood the concepts well. At the end of few such consecutive sessions, students were given feedback form to fill for further analysis. The feedback format consists of questions to know about their choice of method of assessment. The questions were framed in that format to know the better method to assess their depth of knowledge, conceptualizing ability and memory. They were also questioned about the introduction of MCQs in future examination..(See below Table:1) Those feed back forms from the students were assessed by the faculties in the department of Physiology in KAP Viswanatham Government Trichy Medical College, Trichy. Microsoft Excel 2003 was used for Statistical analysis.

Table:1 shows feedback form obtained by the students

Questions asked	A	B	C
You are more comfortable with	Essay	MCQ's	
Which do you think will help you to gain marks	Essay	MCQ's	
Students do categorize yourself	Average	Good	Outstanding
Which one is easy to recall/memorize	Essay	MCQ's	
Which actually helps you to learn the concept?	Essay	MCQ's	
Which method do you think can exhibit your depth of knowledge?	Essay	MCQ's	
Do you wish to have MCQ in your exam pattern	No	Moderate	Yes
Do you wish not to have essay in your exam pattern	No	Moderate	Yes

RESULTS

As per the feedback given by the students, it showed that the students wish to have Multiple choice questions as a routine in their formative as well as summative assessments. The feedback forms were analysed by computing the percentage of students about 84 % of the total students opined that their depths of knowledge were assessed better with MCQ's. Similarly 71% of the total students felt that MCQ's were easier to recall. About 50% of them agreed that the concept learning was better with MCQ's (as shown in Fig:1)

Fig : 2 Pie chart showing Distribution of students, wished to have Essays or MCQs in Examination. Expressed in Percentage(%)

In Fig:2 the pie chart shows that 53% of the students wanted Multiple choice questions in their Formative assessment as well as summative assessment too, whereas about 44% only opted for Essays.

Fig:1 Bar Diagram showing comparison of students in Essays and MCQs

Table 2: **Showing Percentage of Students in Different**

Category of Students	Essay		MCQ	
	Wish to have in exams (%)	Concept learning/ Depth of knowledge (%)	Wish to have in exams (%)	Concept learning/ Depth of knowledge (%)
Average	18	12	25	26
Good	34	37	51	58
Outstanding	1	0.7	1	3

In the feedback form we had asked the students to categorize themselves as average, good, outstanding. Most of the students had categorized themselves as good that is above average category.Table:2 Shows that most of the students comes under above average category wish to have MCQ's in their exams and they consider that MCQ's will help them not only to learn the concept but also assesses their depth of knowledge too. Students coming under average category also have opted for MCQ's comparatively.

DISCUSSION

MCQ's are form of an assessment where the students are asked to choose the best answer from a list of choices[7]. MCQ's are also one among the tools for the assessment of knowledge for both undergraduate as well as postgraduate[8]. Assessment of knowledge is assessing the cognitive domain as per Bloom's Taxonomy. As our students are exposed to long essays in their routine formative assessments conducted at the end of each system, so only the MCQ's were given to the students. Single best answer type multiple choice questions were given. The questions were taken from the previous class lectures and were given at the end of Physiology lecture classes. According to a earlier study, where the students were exposed to both the MCQ's and Short essay questions(SEQ) in their physiology syllabus and were found to perform better with the MCQ's when compared with the SEQ[9]. From the results it is clear that the students wish to have Multiple choice questions because MCQ's help them not only to increase their learning skills but also to show an improvement in the final summative assessment. This may show an increase in their higher cognitive domain function. Though there is wide range of variation between Essay and Multiple choice questions in the assessment tool like depth of their knowledge and memorize easily but with respect to concept learning the

response was equivocal. In the end we decided to introduce MCQ's in their Formative assessments in view to improve their methodology of learning.

CONCLUSION

The analysis showed that the students preferred MCQ's over the essay type questions. Hence we conclude, by introduction of MCQs in their formative assessment will improve their knowledge and also will help them to present better in their final summative assessment.

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Study to Determine Electrocardiographic Changes in Different Trimester of Pregnancy & Compare in Pregnant & Non Pregnant Women

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ABSTRACT

During the pregnancy there is a dynamic change in the structure and electric activity of the heart. The cardiac arrhythmias are seen commonly in later part of pregnancy.The arrhythmias seen in pregnancy are due to potential factors that include the direct cardiac electrophysiological effects of hormones, changes in autonomic tone, hemodynamic change, hypokalemia of pregnancy, and underlying heart disease. Estrogen has been shown to prolong QT interval and precipitate arrhythmias in pregnancy in animal studies.[8],[9] However, there is not much human studies regarding QTc in different trimester of pregnancy. A cross sectional study is done in 150 pregnant women in different trimester and 50 non pregnant women in department of OBG in KVG Medical College sullia. The ECG is recorded in all the pregnant & non pregnant women. There is significant decrease in PR interval when compared with 1st trimester, 2ndtrimester & non pregnant women. QTc interval increases in 3rd trimester when compared with 1st trimester, 2nd trimester and non pregnant women. Results also shows significant increase in heart rate in all three trimesters of pregnancy .

Keywords : Pregnancy, PRinterval, QTc interval.

INTRODUCTION

Cardiovascular diseases directly or indirectly are common cause of death in pregnancy.[1] In the past, many medical disorders were contraindications to pregnancy. Advances in obstetrics, neonatology, obstetric anesthesiology and medicine have made pregnancy possible even in medical disorder with a positive outcome for both mother and fetus. Medical problems that interfere with the physiologic adaptations of pregnancy increase the risk for poor pregnancy outcome.

Pregnancy is the maternal adaptation to natural volume overload state. This is possible because of gene expression or function of signalling molecules that mediate reversible eccentric hypertrophy.These may be activated by estrogen or other G-protein coupled receptoraganist such as endothelin-1. In pregnancy physiological changes affect each & every organ of the body. In pregnancy the cardiac output increases by 40% which is due to an increase in stroke volume. Heart rate increases by ~10 beats/min

.Estrogen mediated increase in myocardial alpha receptors result in an increase in heart rate.[3] The systemic vascular resistance decreases by 15% in the 2nd trimister and this is associated with a fall in blood pressure.[2] This decrease or fall in blood pressure is due to progesterone effect of vasodilatation.as the diaphragm is elevated in advancing pregnancy there is average 15 degree left axis deviation in ECG. All the cambers of the heart enlarges particularly left ventricle. ECG changes in pregnancy include arrhythmias which includes sinus tachycardia, ectopic beats, ventricular arrhythmias etc, left axis deviation, inverted or flatenned T wave & Q wave in lead III & agumented voltage unipolar left foot lead.[3]

Arrhythmias are due to normal or abnormal impulse generation, abnormal impulse conduction, or a combination of simultaneous abnormalities of impulse generation and conduction.4 The mechanism for arrhythmias is abnormal autorhymicity, triggered activity and re-entery phenomenon. Both new & preexsisting cardiac arrthymias

occurs commonly during pregnancy, labour , delivery & puerperium. According to Eghbalu & associates adaptive electric remodeling of k⁺channel gene is the cause for arrhythmia during pregnancy. Even mild hypokalemia & physiological increase in the heart rate serve to induce arrhytmias bradyarrhythmias are compatible with a successful pregnancy outcome.Tacchyarrhymias are relatively common and should prompt consideration of underlying cardiac disease. Paroxysmal supraventricular tacchycardiac is most frequent.Atrial flutter or fibrillation are assoc81ted with the underlying diseases like thyrotoxisis or mitral stenosis.QT prolongation may predispose individual to potentially fatal ventricular arrthymias.

METHODS & MATERIAL

•   **Source of Data:** The study was conducted in the department of Physiology with help of Deparment of OBG of KVG Medical College and Hospital, Sullia, D.K.

Method of collection of data:

•   **Study group:** Pregnant women, attending department of OBG KVG Medical College and Hospital Sullia.

•   **Control groups**: This group consists of age matched non pregnant women.

•   **Age of subjects:** In both the groups, subject in the age group of 19-35 years will be included in the study.

•   **Sample size:** 100 normal pregnant women

100   non pregnant age matched women will be taken as control.

•   **INCLUSION CRITERIA**: Healthy pregnant subject in study group and healthy non pregnant women in control group not involving any of the exclusion criteria.

•   **EXCLUSION CRITERIA**:

1.   Subject with history suggestive of any cardiovascular disease.

2.   Subject with history suggestive of heart blocks and arrhythmias.

3.   Subject with history suggestive of chronic obstructive or restrictive lung diseases.

4.   Subject with history of Diabetes mellitus or hypertension.

5.   Subject with history of smoking or chewing tobacco or alcohol intake.

6.   Subject with obesity.

7.   Subject with hemoglobin less than 7gm%.

The following parameters will be recorded in the subjects:

1. **Record of physical anthropometry of subjects**-

•   Height (in centimetres) - Standing height was measured with the help of the measuring tape fixed to a wall, with bare feet, the heels together and standing erect. It was measured in metres.

•   Weight (in kilograms) - Weight was measured with the help of mechanical weighing machine. The subject is made to stand straight on the weighing machine with bare foot without touching anything. The weight is measured in kilograms.

•   Body mass Index –BMI is calculated by the formula, $BMI = weight (Kg) / height(mt)2$

2. Record of ECG -

(a) Heart Rate (calculated by R-R interval),

(b) PR Interval

(c) QRS Axis,

(d) QTc interval calculation,

(e) T wave.

Techniques to record EKG

A high quality of ECG recording was taken under standard condition to minimize artefacts. Recording should be done in quite room. The subject should be in a relaxed mood. The procedure is explained to them in detail. After a resting period, the subjects ECG were recorded in the supine position.

RESULTS

In our study normal pregnant women are compared with normal healthy women in the age group of 18-35 years were selected. The result obtained were expressed as mean ± SD, statistical test one – way ANOVA for multiple group comparison followed by pos hock tukey test and Chi square test were used for analysing data.

Heart Rate -

Table 1 showing HR in non pregnant & different trimesters

		Mean
HR	Control	72.84±6.14
	Ist TRI	83.11±6.91
	2TRI	84.41±6.40
	3TRI	88.04±9.64

The heart rate was 72.84±6.14, 83.11±6.91, 84.11±6.40, 88.04±9.63 per minute in control, 1st, 2nd & 3rd trimester of pregnancy. The heart rate was significantly increased in all the trimesters of pregnancy when compared with non pregnant women ($p<0.001$). There was also increase in heart rate in 3rd trimester when compared with 1st trimesters ($p<0.05$).

Table 2: Showing PR interval in non pregnant & different trimesters

		Mean
PRI	control	0.15±0.012
	I TRI	0.13±0.018
	2TRI	0.11±0.018
	3TRI	0.10±0.021

PR interval was 0.15±0.012, 0.128±0.018, 0.112±.0183, 0.102±0.021 seconds in control, 1st, 2nd & 3rd trimester of pregnancy respectively. PR interval is significantly reduced in all the trimester of pregnancy when compared with non pregnant women ($p<0.001$). Its also significantly decreased in 2nd & 3rd trimester when compared with 1st trimester of pregnancy ($p<0.01$)

QT interval

The QT interval was 0.345±0.022, 0.34±0.0216, 0.341±0.026, 0.345±0.030 seconds in control, 1st trimester, 2nd trimester & 3rd trimester. There was no significant difference between the controls and different trimesters of pregnancy.

QTc interval

Table 3 showing QTc interval in non pregnant & different trimesters

		Mean
QTc	Control	0.37±0.025
	I TRI	0.39±0.021
	2TRI	0.40±0.022
	3TRI	0.42±0.034

QTc interval was 0.375±0.025, 0.396±0.021, 0.407±0.022, 0.421±0.034 seconds respectively in control, 1st, 2nd & 3rd trimester of pregnancy. There was significant change in QTc interval in all the trimester of pregnancy when compared with control ($p<0.001$) & also in 3rd trimester when compared with 1st trimester ($p<0.001$).

QRS Axis –

Table 4 showing mean QRS axis in non pregnant & different trimesters of pregnancy

	Mean
Control	64.38±8.8
I TRI	62.89±10.32
2TRI	51.4±16.39
3TRI	46.63±19.50

The mean QRS axis was 64.38±, 62.89±10.32, 51.4±16.39, 46.63±19.50 degrees in control, 1st, 2nd and 3rd trimester of pregnancy respectively. The QRS axis was significantly declined in 2nd ($p<0.001$) & 3rd ($p<0.001$) trimester of pregnancy when compared with non pregnant women .It was also decreased in 2nd ($p<0.01$) & 3rd ($p<0.001$) trimester when compared with 1st trimester of pregnancy.

Table 5: Comparison of ECG parameters between pregnant and non pregnant women.

ECG parameters	control	TRI 1	TRI 2	TRI 3
PRI	0.152±0.012	0.13±0.018***	0.11±0.018***aa	0.10±0.02***bb
QTI	0.345±0.02	0.34±0.02	0.341±0.02	0.345±0.02
QTc	0.375±0.025	0.39±0.021***	0.40±0.022***	0.42±0.034***bbb

All values are expressed in mean±SD

*=Control vs group1,group 2,group 3($p<0.001$);

a =group 1vs group 2 ($p<0.01$) ;

b=group1 vs group3 (p<0.01) ;

p value ≤0.05 is significant, p≤ 0.01 is highly significant, p≤ 0.001 is highly highly significant

PR interval was highly significantly reduced in all the trimester of pregnancy when compared with control & it also decreased in 3rd trimester when compared with 1st trimester of pregnancy. There are no significant changes in QT interval when compared with control groups & also with in the trimester of pregnant. The QTc interval was highly significantly increased in all the trimesters when compared with control & also significantly increased in 3rd trimester when compared with 1st trimester of pregnancy.

Table 6 Comparison of HR & QRS axis between pregnant & non pregnant women

ECG parameters	control	1 TRI	2 TRI	3 TRI
HR	72.84±6.14	83.11±6.9[***]	84.41±6.4[***]	88.04±6.63[***b]
QRS axis	64.38±8.87	62.89±10.2	51.4±16.3[***aa]	46.63±19.5[***bbb]

*=Control vs group1,group 2,group 3 (p<0.001);

a=group 1vs group 2 (p<0.01);

b=group1 vs group3 (p<0.05);

Value ≤0.05 is significant, p≤ 0.01 is highly significant, p≤ 0.001 is highly highly significant.

The Heart Rate was significantly elevated in all the trimester of pregnancy when compared with control (p<0.001). HR also increase significantly in 3rd trimester compared to 1st trimester of pregnancy .QRS axis was reduced in 2nd & 3rd trimester of pregnancy (p<0.001) when compared with controls. It also decreases in 2nd (p<0.01) & 3rd (p<0.001) trimester of pregnancy when compared with 1st trimester of pregnancy.

DISCUSSION

• Heart Rate increases as early as 5weeks & continue to increase upto 32weeks of pregnancy.[5] The increase in the heart rate is linked to autonomic nervous system changes that produce alterations in cardiac autonomic modulation. Failure of these adaptations may result in pregnancy related complications.[6] The increase in heart rate was due to a decrease in vagal baroreflex as well as a decrease in parasympathetic tone and incease in sympathetic tone.[7] Early rise in heart rate is related to increased production of human chorionic gonadotropin later gradual increase is due to vascular changes that accompany foetal & placental growth.[8]

This study finds the same way of RovinskyJJ & Jaffin H[20], Clap III F & capeless E[8], Carla A et al, Davis M[16], Stein P[21], Carruth et al[13], Lechmanova et al[14].

• PR interval shortening may be due to the following reasons like increased maternal blood volume, increased oxygen demand leads to relative hypoxia, the body becomes more sensitive to hypoxia leads to myocardial ATP production in the high-energy phosphate bond, sympathetic reflex caused excitement, leading to accelerated conduction atrioventricular junction, leaving PR interval shortened.[6]

This findings was similar to Carruth et al[13], Philip Jpodrid[15], Lechmanova et al[14], Davis M[16].

• QTc interval – The QTc interval is prolonged in all the trimester more in the 3rd trimester. The results were similar to studies done by Parizek A et al [14], Baumert M et al [17], Curtis AB et al[18], Lechmanová M et al[14].But Philip J Podrid[15] showed decrease in QTc interval. Nakagawa et al showed normal QTc interval.

Possible causes for prolonged QTc interval is

• The prolongation of QT intervals in both mothers and foetus during the later period of pregnancy implies that higher levels of progesterone may regulate the function of the human *ether-a-go-go-related* gene (HERG) potassium channel, a key ion channel responsible for controlling the length of QT intervals.[9]

• Excess progesterone causes a HERG trafficking defect. The impaired ERG/I_{Kr} may, in turn, induce imbalance of heart electrical stability and therefore development of ventricular arrhythmias. This may suggest a mechanism to explain why the corrected QT intervals are longer in pregnancy .[9]

• QRS axis – Axis shifts to left with advancing pregnancy more in 3rd trimester compared with 1st & 2nd trimester.

Possible causes for axis deviation

1. Mechanical effects of abdominal distension.[10]

2. Hormonal changes lead to diaphragmatic elevation & barrel shaped thorax followed by a rotation of the cardiac axis.[11]

3. Ventricular hypertrophy & dilatation in pregnancy contributes to left axis deviation.[12]

The results mimics the same findings of Goloba M et al[1], Davis M et al[16], Schwartz DB et al[10], Christopher F [19], Gropietsch G[11]

CONCLUSION

• There is statistically significant increase in Heart Rate, QTc interval ; decrease in PR interval in all trimester of pregnancy and decreased QRS axis in 2nd and 3rd trimester of pregnancy when compared to controls, there is no significant change in QT interval.

• Our study provide a glimpse into variety of adaptation of cardiovascular system during normal pregnancy which bring about changes in ECG in absence of any cardiac disease. The pregnancy induced changes in the cardiovascular system develop primarily to meet the increased metabolic demands of the mother and fetus.[22]

• Further study is needed on estimation of the hormonal level in different trimester of pregnancy and correlating with present study.

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Pre-pondarance of Duodenal Ulcers in O Blood Group Individuals

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ABSTRACT

There is relationship between ABO blood group distribution and Peptic ulcer Disease. This study sought to determine the preponderance of O blood group in patients with peptic ulcer disease in Kamineni Institute of medical Sciences, Nalgonda .Ninety patients with Peptic ulcer disease (56 male and 34 female; mean age: 50±18 years) who attended our endoscopy section were enrolled. Blood samples were used for ABO/ Rhesus (Rh) blood group antigen typing. The ABO blood group phenotype distribution in subjects was as follows: 44.4% (40/90) for group A, 32.2% (29/90) for group B, 42.2%(38/90) for group O and 16.66% (15/90) for group AB. Rh positivity was found in 66.6% (60/90) of patients. In local healthy population, ABO/Rh blood group distribution was 33.8, 20.7, 34.7, 20.4 and 92.6% for A, B, 0, AB and Rh, respectively. AB blood group distribution in healthy population was higher than peptic ulcer disease (20.4 vs 16.6%). In contrast, Rh positivity of Peptic Ulcer Disease is lower than healthy subjects (66.6 vs 92.6%). Variation in the results of studies is related to different study communities. According to these results, probably ABO/Rh blood group has an important role in patients with peptic ulceration. The functional significance of ABO blood group distribution might be associated with biological behavior of Peptic Ulcer Disease. The impact of blood group on Peptic Ulcer Disease may be a focus for further studies.

Keywords: Peptic ulcer disease, blood group, ABO, Rh

INTRODUCTION

In 1953, Aird et al. (1) reported a relation between blood group A and cancer of the stomach. Subsequently, this association has been demonstrated in several studies (2–8).

However, an elevated risk among those with blood group B has also been reported (9). Despite somewhat contradictory results and an unexplained biologic mechanism, blood group A is widely considered an established risk factor for gastric cancer (10). The ABO blood group system is the most widely investigated erythrocyte antigen system for all populations. Frequency of ABO blood group in most of gastrointestinal disorders has been studied yet. For example, it has been known that individuals with blood group O phenotype have higher risk of developing duodenal ulcers. Similarly, gastric carcinoma was found to be associated with blood group A, but no explanation for this condition was found (Bayan *et al.,* 2009).

It was suggested that the greater incidence of group O in patients with ulcer disease might be a reflection of the much higher incidence of group O in patients with gastroduodenal bleeding (Bayan *et al.,* 2009). It is possible that some subjects have gastroduodenal mucosa which is especially liable to haemorrhage. These subjects are more frequently of blood group O. There are also studies that point out that blood group O is more common in patients with bleeding duodenal ulcer than those without bleeding (Horwich and Evans, 1966).

The aim of the present study was to evaluate the preponderance of duodenal ulcers in patients with O blood group and Rh phenotype.

MATERIALS AND METHOD

90 consecutive patients who underwent endoscopy in one endoscopy unit at Mahadevappa Rampure Medical College, Gulbarga and diagnosed as PUD (56 male and 34 female; mean age, 50±18 years) were considered for inclusion into our study (Table 1).

The study protocol was approved by the ethics committee and the patients gave written informed consent to be included in the study. The patients were clinically evaluated and the gastrointestinal signs and symptoms were recorded. Upper gastrointestinal endoscopy was done according to standard medical procedure. Peripheral blood samples were collected from each patient after endoscopy. ABO blood groups and Rh phenotype evaluations were carried out by standard hemagglutination assays. The p-value of less than 0.05 was accepted as statistically significant.

RESULTS

A total of 90 patients were screened. Patients included 34 women (37.0%) and 56 (63.0%) men. Aged 18-82 years (mean, 50±18 years). of which 38 (46%) were smokers. Mean age was 53±17 years for women and 47±19 years for men. Mean age per ABO blood group distribution in patients was as follow: 44±18 years for group 0, 53±20 years for group A. 48±16 years for group B and 44±20 years for group AB. The distribution of mean age between blood groups was similar in patients (p>0.05). The age, gender and smoking habit based on the blood group distribution of these individuals are shown in Table 1.

In present study. The ABO blood group phenotype distribution in subjects was as follows: 44.4% (40/90) for group A, 32.2% (29/90) for group B, 42.2%(38/90) for group O and 16.66% (15/90) for group AB (Table 2). Rh positivity was found in 66.6% (60/90) of patients.

The Rh+ distribution among blood groups was as follow: 29/40(72.5%). 23/29 (79.31%). 26/38 (68.42%) and10/15(66.66%) for blood groups A, B, O and AB respectively.

Table 1: ABO/Rh blood group distribution based on age and gender and smoking habit

Parameters	A	B	AB	O	Rh+	Total (ABO blood groups)	p- value
Age (years)	53 ± 20	48 ±16	44 ±20	44 ± 18	49 ±18	50 ± 18	>0.05
Gender (female/male)	15/17	05/15	1/4	10/19	19/34	32/50	>0.05
Smoking (yes/no)	11/18	10/12	2/3	13/15	20/28	36/45	>0.05

Table 2 :   ABO/Rh blood group distribution in patients

ABO system	A	B	AB	O	Total
Rh+ve	18(22.5)	12(15.0)	2(3.6)	15(18.8)	47 (59.9)
Rh –ve	10(12.6)	6 (7.2)	1 (1.2)	10 (12.8)	27(33.8)
Total	**28 (35.1)**	**18 (22.2)**	**3 (4.8)**	**25 (31.6)**	**74 (93.7)**

(values in brackets are in percentage)

DISCUSSION

In this study carried out, we have confirmed that blood group A is indeed associated with a higher risk of gastric cancer and individuals with blood group O have a higher risk of peptic ulcers than those with other blood groups .

Romshoo *et ol.* (1997) reported that the majority of peptic ulcer patients (56%) had blood group 0 and it though a risk factor for peptic ulcer. In another study. Bayan *et oZ.* (2009) finding contributes to the positive correlation between group O and upper gastrointestinal bleeding caused by gastroduodenal ulcers and erosive gastropathy and the blood group O preponderance in the patients group was seen to be approximately at the expense of group A of the controls.

Besides, Rh positivity was also higher in the patient group than in controls .

We showed that ABO blood group distribution in subjects was as follow: 44.4. 32.2. 42.2 and16.66 % for A, B, O and AB group, respectively. Rh positivity was seen in 66.6% of subjects. According to data from the local

Blood Transfusion Center, in a descending order of blood group frequency: O blood group was detected in 34.7% of population; A blood group in 33.8%; B blood group in 20.7% and AB blood group in 20.4%.

Also. Rh positivity found in 92.6% of healthy population. AB blood group distribution in PUD is lower than local healthy population .

Although. some investigations have showed correlations between O and A blood group with ulcer peptic, our data showed no correlation. This may be due to the prevalence of *Helicobacter pylori* infection among patients with PUD which needs more investigations. It has been reported that the increased susceptibility of subjects with blood group O to peptic ulcer disease might be due to higher density of colonization by *Helicobacter pylori* and higher inflammatory responses (correlated with release of interleukin-6 (IL-6) and tumor necrosis factor (TNF-a)) to *Helicobacter pylori* compared to colonization in persons with other blood groups (Heneghan *et oZ* . • 1998).

It has also been demonstrated that epithelial cells of persons with blood group O bound significantly more to *Helicobacter pylori* than cells of persons with other blood groups (Alkout *et al.,* 2000). Variation in the results of studies is related to different study commrmities and sample size that affect the power of analysis. Further study on the influence of genetic factors, *Helicobacter pylori,* life style and nutrition are suggested.

CONCLUSION

From the study we conclude that the positive correlation between group O and upper gastrointestinal bleeding caused by gastroduodenal ulcers and erosive gastropathy and the blood group O has higher preponderance in the patients with duodenal ulcers . Timely intervention with proton pump inhibitors, and others help people whose **ulcers** come from taking too much aspirin. A doctor may prescribe antibiotics to kill the H. pylori bacteria .

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Effect of Yoga on Pulmonary Function Tests

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ABSTRACT

Back ground: Pulmonary function tests are accurate in assessing the functional status of Respiratory system. Lung Volumes and capacities have relationship with life style such as yoga, pranayamas and regular exercises. Aim: To study the effect of yoga on pulmonary function Tests. **Materials and Method:** The study group comprised of twenty persons, who were practicing kriya yoga and Hong sau technique for minimum of one year duration. Twenty subjects with sedentary life style, who were not practicing yoga and a leisure time activities or activity less than 20 min per day, was considered as control group. Pulmonary function Tests were carried out in both groups to assess the difference. The parameters evaluated were FVC, FEV1, FEV1 / FVC and PEFR. Persons with diabetes mellitus, hypertension, bronchial asthma and trained athletes were excluded from the study Informed written consent from the study and control group was obtained. The results were compared between two groups by using the t-test. The percentage of FVC, FEV1 and PEFR were found to be increased in kriya yoga practioners than the control group. The FEV1/FVC does not show much difference between them. From this study we conclude kriya yoga and Hong sau techniques on regular practice improve the efficiency of pulmonary functions in healthy individuals. Yoga practice is beneficial in sedentary people, by playing a greater value in preservation of health and in prevention of respiratory diseases.

Keywords : *Kriya yoga, Hong sau technique, pulmonary function tests.*

INTRODUCTION

Yoga includes practice of asanas, pranayamas and kriyas. India is the land of spiritual knowledge and leader of spiritual progress of the earth.yoga brings balance to the physical, mental, emotional and spiritual dimensions of the individual.[1] A true yogi achieves a healthy body and a greater longevity and also gains mastery over functions of the body. Kriya yoga is a sacred spiritual science, originating millenniums ago in India. Kriya yoga means "union with the infinite through certain action or rite". Since its introduction into modern culture, yoga has enjoyed a tremendous growth in popularity as an adjunct to healthy living.[2] The Energization Exercise done along with Yoga, enable man to recharge his body with cosmic energy (or) universal Prana. The Hong Sau technique is an integral part of science of kriya yoga.[3] Pulmonary function tests permit an accurate and reproducible assessment of the functional state of respiratory system and allow quantification of the severity of disease. PFTs are used for evaluation of fitness and predicting the safety of taking part in strenuous physical exercise.[4] PFTs are employed to assess the 3 basis processes involved in the supply of O_2 to

and removal of Co_2 from the body ventilation, diffusion and perfusion of lungs.[5] Kriya yoga, pranayamas like Hong-sau technique have been practiced for centuries. Kriya yoga brings peace and stillness of mind, which helps in reducing bronchoconstrictor effect[6]. Hong sau technique produce conscious pattern of respiration, which is slow and steady, that increase the compliance of lungs. Training of these techniques increase the respiratory muscle strength and efficiency of pulmonary function. Kriya yogis tend to have an increase in pulmonary capacity than others. Overall regular practice of Yoga improves the cardiovascular and pulmonary function.[7] Hence, the present study was undertaken to compare the pulmonary function tests in kriya yogis and sedentary group.

MATERIALS & METHOD

The present study was undertaken in 40 subjects. Among them 20 were control group and 20 were study group. The study group includes the persons, who practice kriya yoga and Hong-sau technique regularly for half an hour, both morning and evening with minimum of one year duration. Their age group varies between 30 to 50 years.

They were selected from list of yoga practioners of Yogoda satsanga Society, Dyana Mandali, Thanjavur, Tamil Nadu. This centre is approved by YSS of India, Rachi, Jharkhand. The control group includes the persons, who were not practicing yoga and a leisure time activities or activity less than 20 min per day. They belong to same age group as that of study group. They were selected randomly from Thanjavur Town.

EXCLUSION CRITERIA

Persons with Diabetes mellitus, hypertension, smoking, bronchial Asthma, Other chronic respiratory disease and trained athletes were excluded from the study.

Informed written consent was taken from subjects. Height and weight of the persons were measured. A Performa having complete history and clinical examination was obtained before performing PFT. Both groups were assessed for pulmonary function tests. The tests were recorded by using spirometer-Easyware-2013-version 2.25.00.The best value from three measurements was taken into consideration. The parameters chosen were

- Percentage of forced vital capacity (% FVC)

- Percentage of forced expiratory of Volume in 1st second (% FEVI)

- Percentage of FEVI / FVC ratio

- Percentage of peak expiratory flow rate (% PEFR).

Data after collection was entered on Microsoft Excel spread sheet and analyzed using SPSS version 17.0 statistical software. The data was checked and mean, standard deviations were calculated. Comparison of mean values between the two groups was done using t-test for significance. All statistical tests were two tailed and $P < 0.05$ was considered to be significant.

RESULTS

The present comparative study, consisted of 40 subjects. Among them the study groupconsisting kriya yoga practitioners (20 subjects) and control group comprising 20 sedentary subjects. The gender wise distribution of subjects had equal representation of both sexes in each group. This is shown in Table I.

TABLE- 1: Baseline characteristics of study participants

	Yogic group		Sedentary group		Total	
	N	%	N	%	n	%
SEX						
Male	14	70.0%	14	70.0%	28	70.0%
Female	6	30.0%	6	30.0%	12	30.0%
AGE						
30 to 35yrs	7	35.0%	7	35.0%	14	35.0%
36 to 40yrs	3	15.0%	5	25.0%	8	20.0%
41 to 45yrs	4	20.0%	4	20.0%	8	20.0%
46yrs & above	6	30.0%	4	20.0%	10	25.0%
Total	**20**	**100.0%**	**20**	**100.0%**	**40**	**100.0%**

This cross tabulation shows that among the 40 subjects 30% are female and 70% are male and they belong to age group of 30 to 50 years. pulmonary function test variables in yogic and sedentary groups

TABLE -2: **T-Test**

	Mean	S.D	t	Df	Statistical inference
AGE					
Yogic (n=20)	40.35	6.730	.461	38	.648>0.05
Sedentary (n=20)	39.45	5.568			Not Significant
HEIGHT					
Yogic (n=20)	161.95	8.363	-.747	38	.460>0.05
Sedentary (n=20)	163.90	8.149			Not Significant
WEIGHT					
Yogic (n=20)	65.35	9.965	1.727	38	.092>0.05
Sedentary (n=20)	60.05	9.439			Not Significant
%FVC					
Yogic (n=20)	89.10	8.058	3.420	38	.002<0.05
Sedentary (n=20)	82.40	3.440			Significant
% FEV 1					
Yogic (n=20)	92.40	7.141	5.053	38	.000<0.05
Sedentary (n=20)	83.65	2.996			Significant
FEV1/FVC					
Yogic (n=20)	105.50	8.134	1.333	38	.191>0.05
Sedentary (n=20)	102.50	5.934			Not Significant
PEFR					
Yogic (n=20)	97.35	6.293	3.780	38	.001<0.05
Sedentary (n=20)	90.55	5.010			Significant
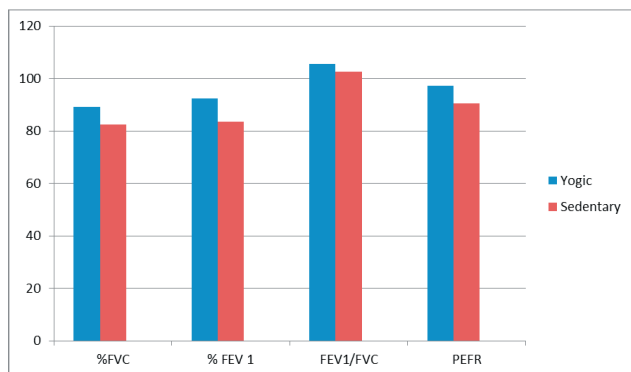
Graph showing comparison of PFT variables in two groups

The mean age and mean anthropometric measurements of both groups have been depicted in Table 2 These findings suggest that both groups were statistically similar and they can be compared. It also shows the results of pulmonary function tests, which were done in yogis and sedentary group. The bar chart shows the comparison of PFT variables between the two groups. The percentage of predicted FVC (% FVC), FEVI (% FEVI), FEVI/FVC ratio (% FEVI/FVC) and PEFR (% PEFR) are shown here. Mean (%), ± Standard deviations are calculated. The mean value of %

FVC in yoga group is 89.10 and for sedentary group 82.40. Mean percentage of predicted FVC value of the Study group was higher, when compared with sedentary subjects and the difference was found to be statistically significant. Similarly, it was found that the mean of % FEVI of the study group (92.40) was significantly higher than that of sedentary group (83.65). Statistically significant difference was observed in the mean percentage of predicted FEVI values of both groups. The mean percentage of FEVI/FVC ratio does not show significant difference, as the values are near to each other. Here the study group has Mean value of 105.50 and control group has 102.50. When % PEFR is compared in both groups,The mean value for study group is 97.35 and for control group 90.55. It shows statistically significant difference among them.

DISCUSSION

Yoga has a great value of as a method of preservation of health and treatment of various diseases. It improves pulmonary ventilation and gas exchange.[8]Food and Oxygen are useful to the body only when acted upon by

the inner life current. If this grows weak from physical and mental abuse, the outer supports of life become ineffective. Kriya yoga and Hong-Sau technique recharge our body and make it healthier.[9] they increase lung function ability. In the present study, when pulmonary function tests were compared in yoga practitioner and sedentary group, significantly higher values were observed in study group. The persons who were practicing kriya yoga and Hong-Sau technique for minimum of one year duration shows better % FVC values than others. Similarly Abhay B.Mane et al[10] have reported that the yoga practitioner, who practiced asana and pranayamas for minimum of 6 months duration, shows much higher % FVC values than sedentary group. In contrary Gupta ss et al[11] shows higher FVC values in Swimmers than yogic groups who get trained for 12 weeks duration. The present study also shows higher %FEVI values for study group than control group. Dr.Vinayak.P.Doijad et al.[12] in their study also observed a significant increase in FEVI values in 60 MBBS students. These students practiced Yoga and breathing exercise for one hour. The FEVI / FVC ratio is used to predict obstructive and restrictive pattern of lung disorders. In our study, there is no significant difference was observed between the two groups. Only little difference was noted. This is in contrary with Patil.Y.R. et al.[13] In their study of effect of Bhastrika Pranayamas on PFT, they found significant difference in FEVI / FVC ratio. PEFR is one of the of the important indicator of pulmonary Function. In our study, the yoga practitioner shows significantly higher values than sedentary group. Dr.Sheetal Panwar et al[14] also observed significantly higher PEFR values in 75 medical students who practiced pranayamas for three months duration. Similar results were observed by Keshur A.Keirmur et al.[15] when they studied 10 weeks of yoga practice on PFT. Thus this study showed the kriya yoga practitioners have comparatively higher values of % FEV1, % FVC and PEFR. There was no significant difference observed in FEVI / FVC ratio when compared with sedentary group. Hence regular yoga practice can be promoted in sedentary group, which brings desirable physiological and physical changes.

CONCLUSION

This study revealed that the sedentary subjects showed comparatively lower performance on PFT than kriya yoga practitioner. Regular practice of kriya and Hong sau technique improves pulmonary capacities. It has beneficial effect on respiration and muscle strength. These techniques on regular practice improve lung function and protect from many lung diseases. Thus yoga promotes health and mental calm.

Abbreviations

PFT- pulmonary function test

FVC-forced vital capacity

FEV1-forced expiratory volume in 1st second

FEV1/FVC-ratio between the two

PEFR- peak expiratory flow rate

Conflict of Interest: Nil

Source of Support : Nil

Ethical Clearance: permission got from ethical committee

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Role of Lifestyle Changes on Body Mass Index in Diabetic Control

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ABSTRACT

Aim- To assess the effect of Neurobics and Sanskar Remodelling in Diabetic management.

Method- This was a intervention, nonrandomised , pre and post study, conducted in the

Department of Physiology, Jawaharlal Nehru Medical College, Wardha. 210 patients were recruited and only 63 were eligible for the study group. The control group of 57 was selected from population. Blood sugar (FBS, PPBS), waist circumference(WC) and body mass index(BMI) was studied in both the groups.

Result- There was a statistically significant fall in WC, BMI, FBS, PPBS, in between the pre and post test findings of study group. A statistical significance was seen on comparison between two groups.

Conclusion-We conclude that Life style modification programme used in our study like

Neurobics and Sanskar –Remodelling has a role in the management of body mass index in Diabetic patients.

Keywords- *Neurobics, Sanskar Remodelling, Diabetes.*

INTRODUCTION

According to WHO, in India alone, diabetes is expected to increase from 40 million in 2006 to 79.4 million by 2030[1].

2011 National Diabetes factsheet released on 26th Jan 2011 estimates about 246 million diabetics worldwide in the year 2010 with prevalence rates of 11.3% among the adults of 20-65 age group[2].

Several studies on migrant Indians across the globe have shown that Asian Indians have an increased risk for developing type 2 diabetes and related metabolic abnormalities compared to other ethnic groups[3]. Despite having lower prevalence of obesity as defined by body mass

index (BMI), Asian Indians tend to have greater waist circumference and waist to hip ratios[4] thus having a greater

degree of central obesity. Again, Asian Indians have more total abdominal and visceral fat for any given BMI and for any given body fat they have increased insulin resistance[5].

Firm positive results from several randomized controlled trials using lifestyle intervention have become available during recent years. The Finnish Diabetes Prevention Study(DPS) was one of the first controlled, randomized studies to show that type 2 diabetes is preventable with lifestyle intervention[6].

Diabetes self-management education (DSME), the process of teaching people to manage their diabetes, has been considered an important part of the clinical management of diabetes since the 1930s. The goals of DSME are to optimize metabolic control and quality of life and to prevent acute and chronic complications, while keeping costs acceptable[7,8].

However, a major challenge is how to implement these findings into "real world" healthcare systems. The resource intensive interventions used in clinical efficacy trials need to be translated into pragmatic, more affordable, programmes, that can be delivered not only in routine clinical practice but also that retain their effectiveness[9]. Despite advances in Diabetes management, many people

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with diabetes have less than optimal metabolic control and continue to suffer from preventable complications. The gap between optimal evidence-based medicine and actual practice can be great, dependent not only on the ability of the clinician to make changes in practice patterns but also on the central role of the patient in implementing optimal management plans in daily life.[10.]

An ancient Indian saying is "Aahar, Baivhaar and Vichar is the key to healthy living. Relating to this age old dictum, one has to practice healthy eating (their own diet depending upon environment, culture and biodiversity), healthy behaviour which can be achieved by Sanskar Remodelling and Positive thinking which can be practiced by a technique called as Neurobics. Neurobics and Sanskar Remodelling are Lifestyle modification programmes and are variants of Rajyoga meditation. Our hypothesis was to test whether Neurobics and Sanskar Remodelling can be of additive support in the management of Diabetes.

METHOD

This was a intervention, nonrandomised pre and post study, conducted in the Department of Physiology, Jawaharlal Nehru Medical College, Wardha. The period of study was 1 year and study participants were diabetic patients, aged between 15-90 years including both sexes.

In this study, 210 patients were recruited and only 63 were eligible for the study group. The control group was selected from population, comprising of 57 patients .

Both groups were oriented to AADE7TM(American Association Diabetes Educators)Self Care Behavior this behavor framework. Orientation class as per AADE7TM was held in the Brahmakumari centre Wardha for both the group of subject on 2 seperate days. Both the group of subjects were oriented ,but the subjects in the orientation group were given the intervention. They were taught **neurobics** through video session by trained facilitators and to **Sanskar Remodelling(SRM)** through lecture by experienced Rajyoga trainers. They practised Neurobics and SRM daily for 10 min in the morning and 10 min in evening. This group was reviewed in the centre every weekend for the first 3 months and after every fortnight for the last 3 months. Patients were called to Physiology department for all investigations. Blood sugar estimation was done at the centre.

Compliance was addressed using a log book where signature of subjects were taken for attending all sessions

of 20 hours. Pre-test and Post test datas were taken before the onset and after completion of the study.

Neurobics in this study was performed as a simple exercise of visualization of cosmic colors and concentrating the cosmic color of yellow, visually on the pancreas[11 ...]

After brief relaxation , the subject visualizes the **soul** as a point of white light shining like a diamond in between the eyebrows.. Then, he focuses on the **Supreme Soul** (who is also a point of white light) and imagines all the color rays of rainbow energy flowing into his body. Next, focus is made on **the healing color of yellow** coming from the Supreme Soul, entering the body through the soul and perfusing the pancreas. They were asked to imagine that pancreas are generating more insulin by stimulation of beta cells, which is allowing improved glucose entry into cells, thus decreasing their plasma sugar levels.

Figure 1-Neurobics

The next intervention given was Sanskar Remodelling for behavior change. In this, the person is sitted upright and concentrates on a point of white light. This intervention has 3 stages namely Initiation, Concentration and Realization.
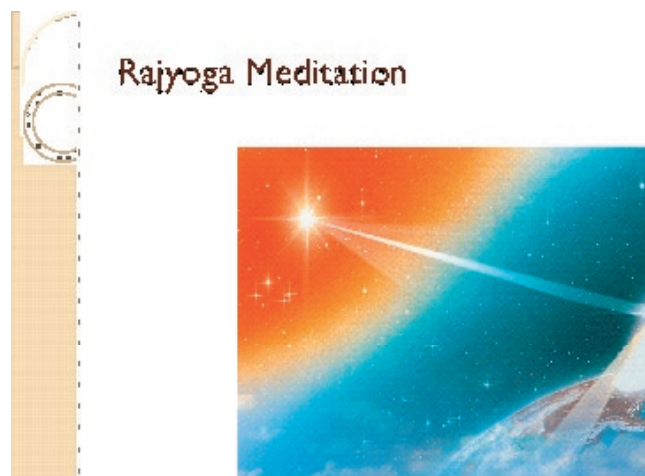
Figure 2- Rajyoga meditation for SRM.

These practice of Rajyoga meditation is on the lines of Brahmakumaris[12].

Outcome Measures-

Data collection period was 3 months. All data were collected by the facilitators.

The key life style outcome measures were blood glucose, waist circumference, and body mass index.

Baseline anthropometric measurement like height and weight were taken at recruitment. Body Mass Index or BMI was calculated using the formula- weight in kg divided by height in meter square as per FEHES 62 [13].

Blood Glucose was measured using a Glucometer namely BG03-Dr Morepen, Gluco one Blood

Glucose monitoring system.

Results were analyzed in the Physiology department of JNMC, Wardha. If any information was required patients were contacted.

Program Evaluation & Statistical Analysis-

Statistical analysis was done using descriptive and inferential statistics using Wilcoxan. Signed Rank test, z-test for difference between two mean and chi square test.

Observation-

1.Age, height and weight-

Table 1: Distribution of patients according to demographic characteristics in study group.

Demographic Characteristics	Mean	SD	Range
Age(yrs)	55.52	14.92	16-82
Gender	48/15		
Ht(meter)	1.66	0.10	1.50-1.80
Wt(Kg)	71.47	7.38	59-80

Table 2: Distribution of patients according to demographic characteristics in control group

Demographic Characteristics	Mean	SD	Range
Age(yrs)	57.68	13.39	17-81
Gender	46/11		
Ht(meter)	1.66	0.10	1.50-1.80
Wt(Kg)	71.36	6.48	59-80

Table 3: Comparison of demographic characteristics in two groups

	Study Group	Control Group	z-value	p-value
Age(yrs)	55.52±14.92	57.68±13.39	0.83	0.40,NS,p>0.05
Ht(mtr)	1.66±0.10	1.66±0.10	0.00	1.00,NS,p>0.05
Wt(Kg)	71.47±7.38	71.36±6.48	0.08	0.93,NS,p>0.05

Table 3 compares the above findings in both study and control group and shows both group were almost matcheable.

2. Waist circumference

Table 4: Comparison of Waist circumference in study group at pre and post test

	Mean	N	Std. Deviation	Std. Error Mean	Difference	z-value	p-value
Pre Test	70.63	63	15.14	1.90	0.12±0.49	2.05	0.045 S,p<0.05
Post Test	70.50	63	15.11	1.90			

Table 5: Comparison of mean difference in Waist Circumference in two groups

Group	Mean Difference	SD	z-value	p-value
Study Group	0.12	0.49	0.95	0.34 NS,p>0.05
Control Group	0.28	1.17		

Table 4 shows the comparison of pre and post test findings of waist circumference in study group. This findings is statistically significant as p <0.05

2. Body Mass Index (BMI)-

Table 6: Comparison of BMI in study group at pre and post test

	Mean	N	Std. Deviation	Std. Error Mean	Difference	z-value	p-value
Pre Test	26.33	63	3.26	0.41	1.14±0.75	11.95	0.000 S,p<0.05
Post Test	25.19	63	3.27	0.41			

Table 7: Comparison of mean difference in BMI in two groups

Group	Mean Difference	SD	z-value	p-value
Study Group	1.14	0.75	11.03	0.000 S,p<0.05
Control Group	0.01	0.13		

Table 6 shows a statistically significant finding between pre & post test findings of BMI in study group. Similar finding is seen on comparision between 2 groups. .

3.Fasting Blood sugar-

Table 8: Comparison of FBS   in study group at pre and post test

	Mean	N	Std. Deviation	Std. Error Mean	Difference	z-value	p-value
Pre Test	227.76	63	42.460	5.35	16.06± 14.57	8.74	0.000 S,p<0.05
Post Test	211.69	63	42.38	5.33			

Table 9: Comparison of mean difference in FBS in two groups

Group	Mean Difference	SD	z-value	p-value
Study Group	16.06	14.57	6.63	0.000
Control Group	1.40	8.54		S,p<0.05

Table 8 shows a statistically significant finding on comparison of FBS in study group.

Table 9 shows the comparison between 2 groups and the finding is statistically significant (p < 0.05)

4.   Postprandial Blood Sugar-

Table 10: Comparison of PPBS   in study group at pre and post test

	Mean	N	Std. Deviation	Std. Error Mean	Difference	z-value	p-value
Pre Test	372.73	63	65.51	8.25	21.84± 17.88	9.69	0.000 S,p<0.05
Post Test	350.88	63	67.18	8.46			

Table 11: Comparison of mean difference in PPBS Glucose in two groups

Group	Mean Difference	SD	z-value	p-value
Study Group	21.84	17.88	7.26	0.000 S,p<0.05
Control Group	2.56	9.50		

The findings of post prandial blood sugar of study group at pre & post test is statistically significant as depicted in Table 10.

Control group findings are insignificant with all the parameters mentioned above.

DISCUSSION

Observational studies have provided firm evidence that multiple life style intervention decreases the risk of type 2 diabetes.

In this study the average age of subjects in the study group was 55 years and in the control group was 57 years. F. Eriksson & F. Lindgarde in their study selected diabetic Malmo male patients in the age group of 47-49 years [14]. Ramachandran A, Snehalatha C et al too had subject with IGT in the mean age of 45.9 ± 5.7 years[15].

 The waist circumference of subjects in the study group showed a significant decrease from a pretest value of 70.63 to a post test value of 70.50. Jaana Lindstorm et al (2008) in their study compared the intervention group (lifestyle intervention) with the control group as regards to waist circumference and found the intervention to be effective in preventing T2 DM [16]. Oksana A

Matvienko et al (2009) compared waist circumference in their subjects at   6th & 12th month of their study and concluded that weight related findings are comparable with those of DPP which means improved anthropometric outcomes in their study helped in diabetes prevention [17].

The Body mass index (BMI) in the control group remained almost same at post test (26.28) whereas the post test finding in the study group showed a decline from 26.33 to 25.19. In the year 2002, Knowler WC, Barnett-Connor et al in their study had subjects with mean BMI of 34.0. After 2.8 Years of follow up, they found that life style intervention was more effective than metformin in reducing the incidence of diabetes in persons at high risk[18]. Oksana A. Matvienko et al (2009) in their study had a sample of 29 T2DM patients who completed a 12 month behavior modification intervention to a achieve and maintain at least 7% weight loss and become more actives. They concluded that weight related findings of this study were comparable with those of DPP (Diabetes Prevention Programme), and that implementation of DPP curriculum in a nonclinical

setting can help some adults at risk for or in early stages of diabetes to improve anthropometric and certain metabolic outcomes[19.]

The improvement in sugar level findings in the study group (Lifestyle intervention group) correlates with finding of many researches namely Jaana Lindstrom et al (2003) in their study named as "Finish Diabetes Prevention Study". (DPS) found that the intensive lifestyle intervention produced long term beneficial changes in biochemical parameters namely plasma glucose and reduced diabetes risk [20]. Marco Mensink et al (2003) found in their study that lifestyle interventions improved glucose tolerance, even in less active population[21]. Uzung Yoon et al (2012) reported the result of 7 trials on efficacy of lifestyle intervention in reducing diabetes incidence in patients with impaired glucose tolerance. Considering the heterogeneity in LSM interventions and follow up time, the systematic review concluded that LSM can have a beneficial effect on the incidence of diabetes[22].

An elemental physiological phenomenon called the "**Relaxation response" (**RR) has been shown to produce changes similar to meditation. This RR can explain the beneficial effects on BP, BMI, FBS and PPBS[23].

CONCLUSION

With all these findings we finally conclude that Life style modification programme used in our study like Neurobics and Sanskar Remodelling has a role in the management of body mass index in Diabetic patients.

Ethical Clearance- Institutional Ethical Committee permission was taken vide reference number DMIMS(DU)/ IEC/2013-14/310.

Conflict of Interest – Nil

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Dielectrophoresis in Clinical Medicine

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ABSTRACT

The paper reports the data on Dielectrophoretic collection rate (DCR) of erythrocytes of healthy persons and patients suffering from thrombosis before treatment and after treatment. In this study, erythrocyte suspension of normal and diseased (Thrombosis) blood is subjected to non-uniform electric field (NUEF) produced by pin-pin electrode configuration. The parameter DCR and measured at constant cell concentration, Frequency and applied voltage. The study reveals significant difference in DCR of erythrocytes of thrombosis patients, when compared with that of healthy persons.

***Keywords :** Erythrocyte, Thrombosis and Dielectrophoretic Collection Rate (DCR).*

INTRODUCTION

The study of non-uniform field effects (NUEF) on biological cells reveals the electrical make up of the basic unit of life. Pohl and his coworkers[1,2] developed the theory of non uniform electric field effects upon neutral particles and established the field of biological cell dielectrophoresis. Gopala Krishna and his coworkers[3,4,5,6] did extensive work on cell dielectrophoresis. They used dielectrophoretic technique for characterization of human blood belonging to different groups and to study the influence of tonicity and anticoagulants on human erythrocytes. Gopala Krishna et al[7] studied the electrical make up of yeast cells belonging to different physiological and environmental conditions by employing the technique of dielectrophoresis. Gulam Ahamad et al[8] reported viscometric data of blood of patients suffering from thrombosis, their study reveals that the viscosity of blood increases significantly due to thrombosis as compared with the normal. Ajay Vasisth et al[9] reported the influence of Diabetes Mellitus on dielectrophoretic collection rate on human erythrocytes. The study reveals significant variation in Dielectrophoretic collection rate (DCR) and excess permittivity of erythrocytes of diabetic

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patients, when compared with that of healthy persons.

MATERIAL AND METHOD

The normal blood samples of different groups were collected from Wama Hospital, Hyderabad in Siliconised bottles in anti coagulant medium heparin. The patients in case of thrombosis were suffering from deep vein thrombosis. The dielectrophoretic studies were carried out within one hour of collection of samples. Red blood cells of normal and diseased blood were isolated from plasma by centrifuging the blood at the rate of 1500 rpm for about 15 minutes. The packed cells were mixed with the isotonic solution (2.1% Glycine and 5.5% glucose in the volume ratio of 9:1). The concentration of the cells was determined using a red blood cell counting chamber and a spectrocolorimeter, with optical density as a guide. The experimental arrangement for cellular dielectrophoretic study has mentioned elsewhere[10].

OBSERVATION & DISCUSSION

To investigate the electric character of the basic cent of life – the cell, dielectrophoretic technique has been employed. The present investigation is mainly concerned with NUEF and its interaction with human erythrocytes, in order to understand how electrical properties of erythrocytes of blood drawn from patients suffering from thrombosis are influenced by the disease. It is indent from the study the magnitude of DCR is found to be less in companion with

the normal blood at 3 MHZ, before and after the treatment. The percentage variation is 67% less before treatment and 57% less after the treatment with respect to DCR for the normal (Table 1 and Table 2).

The DCR of human erythrocytes decreases significantly when compared with the normal at the same frequency (3 MHZ) due to thrombosis before and after the treatment. It means the erythrocyte membrane becomes less dielectric when compared to normal due to thrombosis. It may be mentioned here that the treatment seems to make the erythrocyte membrane more and more dielectric. The mean values of eight patients before and after the treatment were taken for comparison. The dielectrophoretic study of erythrocyte demonstrates that it is possible to monitor the treatment and control the disease and also it can concluded that erythrocyte membrane physiology is influenced or in other words perturbed due to disease. The perturbations in cell physiology are mirrored in DCR spectra.

Table 1: Data on Dielectrophoretic collection rate (DCR) of erythrocytes of healthy persons and persons suffering from thrombosis before treatment.

Time = 2 minutes   optical density (O.D.) = 0.05 at 500nm

Voltage = 30 V_{rms} frequency = 3 MHZ

Condition of the sample	DCR (mm)	% variation in DCR
Normal (15 samples)	89.35 ± 4.16	-
Thrombosis (8 samples)	29.25 ± 5.13	- 67.26

Table 2 : Data on Dielectrophoretic collection rate (DCR) of erythrocytes of healthy person and persons suffering from thrombosis after treatment.

Time = 2 minutes   optical density (O.D.) = 0.05 at 500nm

Voltage = 30 V_{rms} frequency = 3 MHZ

Condition of the sample	DCR (mm)	% variation in DCR
Normal (15 samples)	89.35 ± 4.16	-
Thrombosis (8 samples)	37.55 ± 3.25	- 57.97

CONCLUSION

The study reveals significant difference in DCR of erythrocytes of thrombosis patients, when compared with that of healthy persons. The dielectrophoretic study of erythrocyte demonstrates that it is possible to monitor the treatment and control the disease and also it can concluded that erythrocyte membrane physiology is influenced or in other words perturbed due to disease. The perturbations in cell physiology are mirrored in DCR spectra.

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Assessment of Heart Rate Response to Standing in Hypothyroid Patients

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ABSTRACT

The present study is conducted to find out the changes in heart rate in response to change in the body posture from supine to standing in hypothyroid patients. Heart rate response to standing is one of the autonomic function tests to assess the integrity of the autonomic nervous system. Autonomic dysfunction affects 50% of hypothyroid patients. Consented 60 adult (20 -50 years), 30 were patients with hypothyroidism and 30 controls. Heart rate was recorded before and after changing body posture from supine to standing. The data of the patients was compared with controls and statistically analyzed. Heart rate in hypothyroid patients (4.633±14.4) is less than the controls (16.266±19.8).The change is significant at $p<0.004$. Our findings showed that decreased levels of thyroid hormones in hypothyroid patients alter the autonomic activity on heart.

Keywords: *Hypotension, Changing supine to standing body Posture, Hypothyroidism, Autonomic Nervous System, heart rate.*

INTRODUCTION

Study of variations in heart rate has been used to investigate effect of altered autonomic nervous system function on the cardiovascular system [1] and also useful to evaluate therapeutic purposes [2]. Hypothyroidism is an endocrine disorder; where the thyroid gland is secreting inadequate levels of thyroxine to controls the metabolic and other functions of the body. Thyroid hormones exert their significant action on cardiovascular system[3]. A minimal decrease of circulating thyroid hormones may cause cardiovascular abnormalities[4]. It was found that the autonomic regulations on cardiovascular system were changed due to alter in thyroid hormone levels in the body[5]. It has long been recognized that Cardiovascular abnormalities are common in patients with hypothyroidism such as impaired cardiac contractility, decreased cardiac output, increased systemic vascular resistance and cardiac

abnormalities [6]. Electrocardiographic changes such as bradycardia, low voltage, and varying degrees of heart block are commonly recognized in hypothyroid patients [7].

Very few studies are available on autonomic nervous system function in hypothyroidism. In hypothyroidism there is a reduced sympathetic discharge and the parasympathetic discharge to myocardium[8]. Based on cardiovascular reflexes changes to standardized stimuli, recently many non invasive, simple, reliable and reproducible autonomic function tests have been described[9]. The standardized autonomic function tests used to measure the reflex activity of heart in response to change in posture is heart rate response to standing(10).When a person make sudden changes in his body posture i.e., from supine to standing or sitting to standing, there is a reflex change occur in blood pressure (orthostatic hypotension) and heart rate(tachycardia). The autonomic nervous system plays a major role to regulate and adjusts the blood pressure appropriately.

MATERIAL AND METHOD

A total of 60 subjects, 30 were test group selected from the patients attending O.P.D of endocrinology who is having hypothyroidism and 30 controls were

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recruited in the study. The age range was from 30-50 years. Controls were the teaching and non teaching staff of Narayana Medical College. The study took place in the Department of Physiology at Narayana Medical College, Nellore.A.P. For this study the levels of T3, T4, and TSH were tested from hypothyroid patients. The entire control groups were healthy .Subjects that was sick and have orthostatic intolerance, unexplainable syncopal episodes were not allowed in the study. The study was approved by institutional ethical committee. Written informed consent from the participants was obtained after explained the instructions and procedures to the each and every participants.

HEART RATE RESPONSE TO STANDING

On changing the posture from supine to standing heart rate increases immediately by 10-20 beats per minute. This response is detected by recording ECG in supine and standing postures.

Principle: Immediately on standing from supine posture, heart rate increases by 10-20 beats.

Apparatus:

1. Cardiowin system: PC based 12 channel

simultaneous digital ECG

Genesis Media System Pvt Ltd.

Hyderabad – 1, A.P., India

Serial No. CAR / 050604

Date: 13.05.2006

2. ECG Jelly

METHOD

All Participants were prepared for electrode placement for measurement of heart rate through 3 lead Electrocardiograph (ECG). The subject was asked to lie down in supine posture for 3 min. ECG electrodes were connected from the subject to the cardiowin system. Subject was asked to relax completely for a minimum period of 10 minutes. Basal heart rate was recorded by using cardio win system. Subject was asked to stand up immediately and change in heart rate is noted from the monitoring screen of cardio win. Heart rate response to standing was determined by using the formula heart rate in standing position – heart rate in supine position.

RESULTS

Table 1: Heart rate response to standing data of study and control subjects

Participants	Number of participants	Mean	Std.deviation	P value
Hypothyroids	30	4.6333	14.43292	0.004
Controls	30	16.2666	19.85856	

(P Value < 0.05 = Significant)

Table 1 shows the data of heart rate response to standing in study and control groups. Heart rate was compared in both the groups. Mean heart rate response to standing in Hypothyroids was less (4.633± 14.43) as compared to (16.266 ± 19.85) among the controls, which was found to be statistically significant.
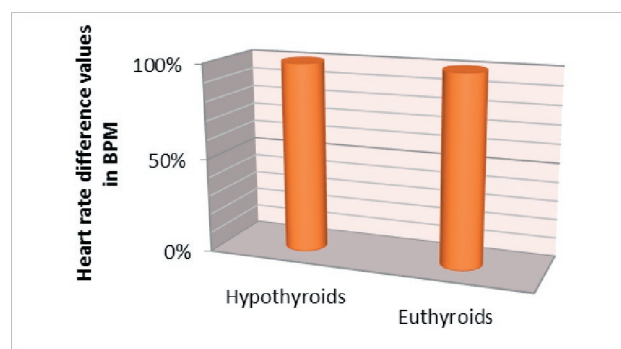
Graph 1: HR response to standing values in hypothyroids and control group. The HR response to standing values are in hypothyroids the values are statistically significant (p value = 0.004).

DISCUSSION

Normal function of the cardiovascular and autonomic nervous systems is compulsory for a normal reflex heart rate response to changes in the body posture. Mechanisms related to immediate heart rate response to standing are based on the interlinked system [11].When a person assumes a standing posture from supine posture, gravity causes pooling of blood in the lower limbs. This leads to decrease stretch of baroreceptor and activation of vasomotor center, which leads to increased sympathetic discharge, decreased vagal tone, increases peripheral vascular resistance, venous return and cardiac output by that means the decrease in blood pressure is restricted [12]. An index of the reflex heart rate response to standing are the ratio of the R-R intervals of the 30th and 15th beats after standing, the 30:15 ratios[13]. Orthostatic hypotension, a neurologic symptoms produced by reduced cerebral perfusion. This is also developed when there is autonomic nervous system dysfunction, insufficient intravascular volume, decreased venous return and inability to increase cardiac output in response to postural changes [14].

It is well known fact that the hypothyroidism impairs the autonomic regulation on cardiovascular system by determining a sympatho-vagal imbalance. A previous study have stated that this change is mainly due to the absence of sudden reduction of cardiac vagal tone by modified vagal function [15]. Many studies have been showed that in hypothyroid patients, the responsiveness to endoge nous catecholamines was decreased even there is high plasma norepinephrine levels are present. This suggesting that there is desensitization at the receptor or post-receptor level [16]. This may explain that despite of elevated plasma norepinephrine levels; there is a reduction in basal and maximal heart rates and a decreased cardiac chronoscopic response to β-adrenergic stimulation in hypothyroidism patient [17].

In our study we assessed and compared the heart rate response to standing in hypothyroids and normal people. We found hypothyroid patients showed a significant reduction in the heart rate response to standing as compared to the control group. From our study we stated that in the absence of thyroid hormones along with autonomic nervous function, the properties of heart like Contractility, excitability is also decreased due to reduction in adrenergic stimulation. Contractility of myocardium is decreased under the lack of influence of thyroid hormones to increases the myocardial up taking of calcium ion and adenylyl cyclase activity. Hypothyroid patients exhibit lower sympathetic responses on change in body posture.

CONCLUSION

In conclusion, the findings of our study suggested that Patients with hypothyroidism often have abnormalities of the autonomic nervous system along with myocardial abnormalities results in reduced heart rate in response to standing. The observation of the present study is similar to the studies done by other researchers with respect to autonomic dysfunction to change the heart rate in response to change in posture from supine to standing in hypothyroids. Further studies are needed on receptor level to assess autonomic dysfunction in hypothyroidism.

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Comparative Study of Cardiovascular Risk Factors in Diabetic Patients of Both Sexes in Rajasthan Population

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ABSTRACT

100 male and 100 female known diabetics, age between 40-60 years were studied. In males 32%were hypertensive, 28%were Alcoholics, 25% were Smokers and 15%were dyslipidemics.In females 42% were Hypert ensive,dyslipidemics were 48%,and Alcoholics were 10%. This study evaluates the risk factors of Cardiovascular diseases in diabetics of both sexes and predict the probable fatal related to cardiovascular diseases aggravated by hyperglycemia & these risk factors. Cardiovascular Diseases are more severe in females as compare to Males, could be due to medical illiteracy among females Hence cardiovascular mortality is more in Females [1][2]. It is unavoidable to create awareness. Among diabetic people to take preventive measures to maintain not only normal sugar level but BP and cholesterol levels also. They should avoid smoking and Alcohol to lead normal healthy life because India has become capital of Diabetics

Keywords: *CVD =Cardiovascular Diseases, HTN =Hyper tension, Diabetics.*

INTRODUCTION

As diabetic is a major health problem that approached epidemicproportion globally. The number of population in type-2 diabetics in India about 40.9 million and expected to raise 101 million in 2030.[3] Which create multiple grave complications like Myocardial infarction, diabetic retinopathy, Gangrene etc. Hence to control sugar level it needs to avoid smoking, Alcohol, cholesterol food which causes HTN and dyslipidemia which attacks CVS because Ticking hypothesis has proved that, clock for coronary heart disease start ticking before onset of clinical diabetics[4]. Hence attempt is compare the CVD in both sexes so that, it may create awareness among diabetics and lead normal healthy life.

MATERIAL AND METHOD

100 male and 100 females of known diabetics, aged

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between 40-60 years who are regularly visiting Pacific Medical College and Hospital Udaipur –Rajasthan were selected to study. Their habits, B, Blood profiles study were recorded and compared in both sexes. The patients belonged to urban middle class subjects. The duration of this study was about two years.

OBSERVATION AND RESULTS

Table-1 CVD risk factors in Male diabetics were HTN 32%, Alcoholics 28%, Smokers 25%, Dyslipidemia 15%

Table -2 CVD Risk factors in Females HTN 42%, Dyslipidemia 48%, Alcoholic 10%,

DISCUSSION

In the present study CVD risk factors in Male diabetics were HTN 32%, Alcoholics 28%,Smokers 25%, Dyslipidemia 15% (Table-1)CVD Risk factors in Females HTN 42%,Dyslipidemia 48%,Alchoholic 10%, (Table-2). This study was more or less in agreement with previous studies[5][6]. Females were more prone for CVD risk factors because of central obesity[7] and dyslipidemias. High serum cholesterol, high serum triglycerides, high LDL, high HDL Cholesterol are known to be associated with diabetics[8] in

urban areas as compare to rural areas. Every year CVD affects more lives of Females than males. CVD affect 450,000 women annually in South Asian region[9]. The probable reason could be that, diabetes alters estrogen related protective mechanism and causes adverse changes in CVD risk factors leading to enhanced atherogenisis in females[10][11]. Moreover biological sex differences in CVD morbidity risk could be distinct biological and gender related occultation. Life style and cultural habits demonstrated stronger influences on metabolic disorders than those from genetic factors[12] and less intake of dietary Zinc and low serum Zinc levels were also associated with increased prevalence of CVD and Diabetics in urban populations[13]. In addition to that, majority of Indian females suffer from Obsessive compulsion Disorder (OCD) problems because their feelings and liberty are bounded by culture andreligious bindings which aggravates HTN, Obesity which lead to CVD Risk factors because already they are diabetic.

Table-1: Cardiovascular risk factors in Male diabetic patients

Particular	No. of Patients	Percentage (%).
Hypertensive	32	32%
Alcoholic	28	28%
Smokers.	25	25%
Dyslipidemias.	15	15%

Table-2 : Cardiovascular disease in Female Diabetic patients

Particular	No.of patients	Percentage (%)
Hypertensive	42	42%
Dyslipidemias	48	48%
Alcoholics	10	10%

SUMMARY AND CONCLUSION

The present comparative study of risk factors in diabetics which are more severe in Females than males. It requires to create awareness among urban middle class people to avoid smoking and Alcohol, especially in females who are illiterate and unaware of risk factors. Moreover illiteracy and poverty are also main hindrances to late approach for proper diagnosis and treatment. It is also

believed that, CVD and Diabetic have common genetic and environmental antecedents. It has been also hypothesized that, Insulin resistant is the subsequent increased risk of CVD in Diabetics but this comparative study demands further Endocrine and genetic study because exact quantity of secretion of Insulin align with Hemodynamic pressure and rhythmicity of heart is yet be understood.

This research paper is approved by Ethical committee of Pacific medical college and Hospital Udaipur –(Rajasthan)

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A Study of Serum Lipid Profile in Parkinson's Disease

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ABSTRACT

Aim: To assess the serum lipid profile in Parkinson's disease patients.

Materials and Method: This study was carried out in the Department of Neurology, Kilpauk Medical College on thirty patients with Parkinson's disease. Thirty normal subjects attending the master health checkup was taken as control. Serum lipid profile was estimated by Colorimetric method in the Biochemistry laboratory, Kilpauk Medical College, Chennai.

Results: The different parameters were analyzed by two sample 't' test. Results derived by statistical analysis of data are presented in tables. Serum total cholesterol, LDL cholesterol, VLDL cholesterol & triglyceride levels are significantly decreased in patients with Parkinson's disease. Serum HDL cholesterol does not differ significantly in Parkinson's disease patients from controls.

Keywords: *Parkinson's disease, Apo E-2 allele, total cholesterol, LDL cholesterol, triglycerides*

INTRODUCTION

Parkinson's disease is the first disease identified as being due to deficiency in a specific neurotransmitter[1]. The concentration of dopamine in the substantia nigra and the neostriatum is reduced to about 50% of the normal. Parkinson's disease is characterized by bradykinesia (paucity and slowness of movement), resting tremor, muscular rigidity, shuffling gait and flexed posture[2,3].

Patients with Parkinson's disease have a lower occurrence of heart attack and stroke than people who do not have the disease. The association between serum cholesterol level and the risks of neurodegenerative diseases are debated. Some prospective studies have found that high serum cholesterol may increase the risks of dementia/Alzheimer's disease.

Disturbances in cholesterol homeostasis may influence the structure, function and maintenance of neuronal membranes and synapses[4]. The aggregation of alfa synuclein is believed to play a critical role in the pathogenesis of Parkinson's disease[5]. However, the association between serum cholesterol level and several neurodegenerative disease risks has been debated.

The apolipoprotein E (APOE) ε2 allele has been associated with both Parkinson's disease and lower low density lipoprotein cholesterol (LDL -C). A recent systematic review, however, demonstrated that ε2 allele is positively associated with higher prevalence of sporadic Parkinson's disease.[6]

C.E.Teunissen, et al., and M. Sohmiya, et al., in two independent case control studies showed that serum total cholesterol did not differ significantly between Parkinson's disease patients and controls. [7,8] In another large retrospective case control study, **G. Scilgliano, et al.,** also did not find any association between serum total cholesterol and the occurrence of Idiopathic Parkinson's disease[9].

Later, a case control study including 124 Parkinson's disease cases and 112 controls by **X. Huang, et al.,** showed that lower concentrations of low density lipoprotein (LDL-

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C) cholesterol were associated with higher occurrence of Parkinson's disease. But serum high-density lipoprotein (HDL -C) cholesterol did not differ significantly between Parkinson's disease patients and controls[10,11]. In the Rotterdam study conducted in Netherlands by **L. M. De Lau, et al.,** the higher levels of serum total cholesterol were associated with a significantly decreased risk of Parkinson's disease[12].

In the above studies on the association between total serum cholesterol and the risk of Parkinson's disease, the results are inconsistent. But there is a definite association between low concentration of LDL cholesterol and higher occurrence of Parkinson's disease.

This study aims at detecting any association between total cholesterol, LDL cholesterol and Parkinson's disease and to establish these parameters as risk factors for the development of Parkinson's disease, one of the most debilitating diseases affecting mankind.

MATERIALS AND METHOD

The study was conducted on 30 cases of Parkinson's disease inclusive of both sexes with age group above 45 years, from the outpatient Department of Neurology, with due permission of the Head of the department and the Dean, Kilpauk Medical College Hospital. The control group was obtained from the normal volunteers attending Master Health Checkup in the Out-Patient Department of Government Kilpauk Medical College Hospital. The

subjects were briefed about the study and a written consent was obtained from them. Ethical clearance was obtained. The clinical evaluation including a thorough history, measurement of blood pressure, pulse rate and detailed physical examination for tremor, rigidity and bradykinesia was carried out. Serum lipid profile was analyzed in a fasting blood sample by calorimetric method in the biochemistry laboratory.

RESULTS

The information collected regarding all the selected cases and controls were recorded in a Master Chart. Data analysis was done for statistical significance [hypothetical testing] using Minitab software version 15 and matrix data plot. The different parameters were analyzed by two sample 't' test. Results derived by statistical analysis of data are presented in tables.

In this study, there were 23 male and 7 female patients, in the age group between 47 years to 87 years with a mean age of 57.83 years + 9.43 years. Similarly, the control group comprised of 23 male and 7 female patients, in the age group between 45years to 70 years with a mean age of 54.03 years + 6.20 years.

There is a significant difference [p value=0.000] in total serum cholesterol level between patients with Parkinson's disease and controls [Table-1]. The mean total cholesterol is 142.3mg/dl in Parkinson's disease patients whereas it is 203.5mg/dl among the control group.

Table-1: Total cholesterol in patients and controls					
	No. of subjects	Mean	Std. deviation	T value	P value
Cases	n = 30	142.3	16.7	-7.44	0.000**
Controls	n = 30	203.5	41.9		
P value: Significant					

On comparing the serum LDL-C level, there is a significantly low level of LDL-C in the Parkinson's disease group than in controls. The mean level of LDL-C is 78mg/dl in the patients compared to a high level of 136.7mg/dl, as shown in Table-2.

Table-2: LDL cholesterol in patients and controls					
	No. of subjects	Mean	Std. deviation	T value	P value
Cases	n =30	78	10.6	-8.59	0.000**
Controls	n =30	136.7	35.9		
P value: Significant					

There is no significant difference in HDL-C level between patients and control group [Table-3]. The mean level of HDL-C in controls is 37.73mg/dl and 39.15mg/dl among the patients with Parkinson's disease.

Table-3: HDL cholesterol in patients and controls					
	No. of subjects	Mean	Std. deviation	T value	P value
Cases	n = 30	39.15	7.79	0.86	0.399
Controls	n = 30	37.73	4.78		
P value: Not significant					

On analysing the VLDL-C level, it is found that there exists a significant difference among the two groups [Table-4]. The mean VLDL-C level is 24.8mg/dl among the cases whereas it is 30.23mg/dl in the control group.

Table-4: VLDL cholesterol in patients and controls					
	No. of subjects	**Mean**	**Std. deviation**	**T value**	**P value**
Cases	n =30	24.8	10.1	-2.22	0.030**
Controls	n =30	30.23	8.68		
**P value: Significant					

The serum triglyceride level is comparatively low among the patients than in the control group. The mean triglyceride level in cases is 129.2mg/dl, whereas it is 156.6mg/dl in the control group [Table-5].

Table-5: Triglycerides in patients and controls					
	No. of subjects	Mean	Std. deviation	T value	P value
Cases	n =30	129.2	46.1	-2.24	0.029**
Controls	n =30	156.6	48.6		
** P value: Significant					

DISCUSSION

There are numerous risk factors proposed for the etiopathogenesis of Parkinson's disease, most of them are hypothetical and appropriate studies have to be conducted to prove the association. One such correlation is the association between serum lipid profile and the risk of occurrence of Parkinson's disease. The results of previous studies on this association are inconsistent. No such study has been done in our Indian population so far.

This study is intended to analyze the serum lipid profile in patients with Parkinson's disease and compare with control group. All the parameters of lipid profile such as total cholesterol, LDL-C, HDL-C, VLDL-C and triglycerides are studied.

In this study, there is a significant reduction in total cholesterol in Parkinson's disease patients when compared with controls. This is similar to Rotterdam study, by L.M.De. Lau, et al.,. They reported that higher levels of serum total cholesterol were associated with a significantly decreased risk of Parkinson's disease[12].

C.E. Teunissen, et,al., and M.Sohmiya,et al., in their respective studies observed that serum total cholesterol did not differ significantly between patients and controls [7, 8]. Studies done by G.Scilgliano, et al., also did not find any association between serum total cholesterol and the occurrence of Parkinson's disease[9].

On analyzing the data obtained, there exists no significant difference in HDL cholesterol level between Parkinson's disease patients and controls. Similar results were observed by X. Huang, et al., in their case control study[10].

The most striking finding in this study is that there is a highly significant decrease in serum LDL levels in patients with Parkinson's disease than the control subjects. This is in accordance with the study of X.Huang, et al., who showed that lower level of LDL cholesterol were associated with

higher occurrence of Parkinson's disease[10,11]. There exists a significant reduction in the levels of VLDL cholesterol and triglycerides, between the patients and control group.

In this study, low levels of total cholesterol, LDL cholesterol, VLDL cholesterol and triglycerides were observed in the Parkinson's patients. These factors could be considered as modifiable risk factors for the occurrence of Parkinson's disease. Identification of such factors may help in prevention of the disease as they could be used as targets for intervention.

CONCLUSION

Thus from the above study, it is evident that low level of cholesterol is associated with a higher occurrence of Parkinson's disease.

• Serum total cholesterol, LDL cholesterol, VLDL cholesterol& triglyceride levels are significantly decreased in patients with Parkinson's disease.

• Serum HDL cholesterol does not differ significantly in patients from controls.

The sample size is too small to arrive at a definite conclusion about the low cholesterol level and the risk of Parkinson's disease. However, these observations are clinically relevant and deserve to be confirmed in larger prospective studies.

If such an association is found in large scale studies and proved, these parameters can assist health care professionals to identify the persons at greater risk for Parkinson's disease, who would benefit most from therapeutic interventions. Early interventions along with life style modification will reduce the mortality and morbidity, improve their quality of life and minimize the burden on society. If such an association is proved in a larger prospective study, the propaganda of routine use of lipid lowering drugs has to be reconsidered.

Conflict of Interest: Nil

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Ethical Clearance: Taken

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PMS (Premenstrual Syndrome) Symptoms in Adolescent Girls and Correlation of Physiological, Psychological and EEG Findings

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ABSTRACT

Background: The etiology of PMS remains obscure inspite of intensive research. PMS is multifactorial disorder resulting from combined influence of genetic hormonal, biochemical and environmental factors that affect the performance of the adolescent girls globally particularly during the formative years of their life.

Objectives and Methodology: To find if PMS might be the cause of physical and psychological complaints in the study group and assess the knowledge of these girls and their mothers on PMS who are confused about vague symptoms and its effect on their daily activity and also studies.

Results: The symptoms in the study group were related to the menstrual cycle in the classical temporal PMS pattern. The complaints of the person revolved to a large degree around and after ovulation the time estrogen progesterone levels shift.[18]

Association of PMS with cyclic hormonal changes is noticed.

Keywords: OVARIAN STEROID HORMONES,EEG,BBT, BMI,PMS.

INTRODUCTION

This study is to establish association of PMS with cyclic hormonal changes and examine merits of clarifying association between ovulation and PMS.

There is extensive literature on the subject, especially on the hormonal patterns in pubescent and adolescent girls.

The symptoms of PMS sometimes wrongly attributed to unexplained depression and migraines and treated without any relief.

If the physician accepts the history uncritically, PMS may be misdiagnosed as a serious depressive disorder or a simple headache as migraine.[11]

In this study effort is taken to make them understand that cyclic hormonal changes are the reason for the physical and psychological disturbances that they experience and how they can cope with that by life style modifications , diet and positive approach.

It is not clear what symptoms seen during premenstrual period fall under those actually due to and related to hormonal cyclic changes during menstrual cycle.

Although there have been previous studies from West which support the same, but their different study population limits its relevance in India.

A number of conditions worsen during the premenstrual or menstrual phase of the cycle, a phenomenon referred to as **menstrual magnification .**

Migraines: About 50% women with migraines report an association with menstruation, usually in the first days before or after menstruation begins. Compared to migraines that occur at other times of the month, menstrual migraines more severe, last longer, and no auras.

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Asthma: Asthma attacks often worsen during the premenstrual period.

Other Disorders: Many other chronic medical conditions may be exacerbated during the premenstrual phase, including epilepsy and other seizure disorders.[10]

OBJECTIVES AND METHODOLOGY

The observational descriptive study was conducted between 2012 and 2015.

During the study period 100 girls with symptoms of PMS were taken.

Cyclic symptoms that occur before the menstrual period and resolve with menses in girls with suspected premenstrual syndrome (PMS) identified.

We excluded subjects in which symptoms were not continuous.

Study group are advised to chart symptoms daily for two cycles.

Basal body temperature recorded by self before getting up from bed in the morning daily for 2 months.

Recording of EEG taken 4-5 days before next expected period.

PMS symptoms divided into five basic categories

(A, C, D, H, and O) as follows.

PMS-A (anxiety) symptoms

- Difficulty sleeping
- Tense feelings
- Irritability
- Clumsiness
- Mood swings

PMS-C (craving) symptoms

- Headache
- Cravings for sweet /salty /other types of foods

PMS-D (depression) symptoms

- Depression
- Angry feelings for no reason
- Feelings that are easily upset
- Poor concentration or memory
- Feelings of low self-worth

PMS-H (hydration) symptoms

- Weight gain
- Abdominal bloating

- Breast tenderness

PMS-O (other) symptoms

- Dysmenorrhea
- Change in bowel habits
- Frequent urination
- General aches or pains
- Acne

DIAGNOSTIC CRITERIA

Symptoms must occur during the last week of the premenstrual (luteal) phase in most menstrual cycles, resolve within a few days after the period starts, interfere with work or social functioning. Symptoms should not just be those of another underlying disorder.[12]

Five or more of the above symptoms must occur:

For ease of study the group is divided into moderate and severe group.

This demonstrated symptoms clustering around the luteal phase of ovulation, with resolution when menstruation begins.[6]

Detailed history is taken about other conditions like epilepsy, behavioral disorders to rule out that do not cluster during the luteal phase.

RESULTS

100 adolescent girls with symptoms suggestive of PMS and consent to participate taken.

Data compiled and entered into Microsoft Excel and statistically analysed. Results were expressed as the mean ±SD . Comparisons were performed by using student's chi-square test and p-value.

Mean age of the group under study is 17.99 with range of 17-19yrs.

Mean age of onset of PMS symptoms is 16.09 with range of 15-16 yrs

Mean age at menarche of this group is 11.47 with range of 11-13 yrs

Age-wise distribution in (Table 1) reveals that percentage of study subjects with PMS who attained menarche before 12yrs of age is 85% and after 12 yrs is 15%.

Table 1 Prevalence of PMS in early menarche

Age at Menarche	No. of Girls	No PMS	PMS
11-12	87 (89.86)[0.09]	13 (21.57) [3.40]	74 (68.29) [0.48]
>12	13 (10.14)[0.80]	11 (2.43) [30.13]	2 (7.71) [4.23]

The chi-square statistic is 43.8987. p-value is < 0.00001. Significant at p < .05

Table 2 Prevalence of Obesity in PMS

Age at Menarche	No of Girls	PMS	BMI >35	BMI >30
11-12yrs	87 (93.00) [0.39]	74 (70.68) [0.16]	17 (15.81) [0.09]	48 (46.50) [0.05]
12yrs	13 (7.00) [5.15]	2 (5.32) [2.07]	0 (1.19) [1.19]	2 (3.50) [0.64]

The chi-square statistic is 9.7339. The *p*-value is .020969. The result is significant at *p* < .05.

BMI >35 was   15.81±0.09 and BMI >30 was 46.50±0.05 in the group with age at menarche 11-12 years.

Table 3 Average time of appearance of PMS after menarche

Age at menarche	No of Girls	PMS	>4yrs	<4yrs
11-12yrs	87 (93.25) [0.42]	74 (70.87) [0.14]	72 (69.01) [0.13]	2 (1.87) [0.01]
>12yrs	13 (6.75) [5.80]	2 (5.13) [1.91]	2 (4.99) [1.79]	0 (0.13) [0.13]

The chi-square statistic is 10.3301. *p*-value is .015959. The result is significant at *p* < .05.

No. of subjects with symptoms of PMS started after around 4years of menarche were   69.01±0.13.

Table 4 Correlation of PMS with Ovulation

Age at menarche	No of girls	PMS	With signs of ovulation indicators	Rise in BBT of 1°F
11-12yrs	87 (93.69) [0.48]	74 (71.20) [0.11]	69 (66.52) [0.09]	52 (50.59) [0.04]
>12yrs	13 (6.31) [7.09]	2 (4.80) [1.63]	2 (4.48) [1.37]	2 (3.41) [0.58]

The chi-square statistic is 11.3921. *p*-value is .009784. The result is significant at *p* < .05.

Out of 100 study group 87 of 11-12 yrs menarche group 66.52±0.09 have signs of ovulation and 50.59±0.04 have recorded rise of BBT about 12 days before next period.

Table 5: Comparison of EEG patterns

Age at Menarche	No of Girls	With PMS	EEG Pattern in subjects with Moderate PMS c/o Migraine with increased α-rhythm taken before periods	EEG Pattern in subjects with Severe PMS c/o Migraine with increased α-rhythm taken before periods
11-12yrs	87 (92.55) [0.33]	74 (70.34) [0.19]	66 (62.93) [0.15]	9 (10.18) [0.14]
12yrs	13 (7.45) [4.13]	2 (5.66) [2.37]	2 (5.07) [1.86]	2 (0.82) [1.70]

The chi-square statistic is 10.8675. *p*-value is .012464. The result is significant at *p* < .05.

EEG recordings taken 4-5 days before next expected period showed increased α-rhythm . Out of 74 of 87 PMS with age at menarche 11-12 years , 66 (62.93±0.15) with moderate PMS and 9 (10.18±0.14) with severe PMS recorded increased α-rhythm.

DISCUSSION

Premenstrual syndrome (PMS) is a recurrent luteal-phase condition characterized by physical, psychological, and behavioural changes of sufficient severity to result in deterioration of interpersonal relationships and normal activity.[7]

Symptoms are indeterminate among individuals and regarded as a condition of dysregulation for which cyclic hormonal variations provide the stressor.

Some of the symptoms are characteristic of depression and antidepressant and antianxiety medications provide little relief and involves undesirable side effects. **The fundamental issue is "dysregulation", for which the remedy is "reregulation", rather than the more unilateral intervention by anti-depressants or anti-anxiety medications.[17]**

Most of these individuals sought help for specific symptoms which troubled them, rather than for "PMS".

The definitive cause of PMS is unknown.

Theories of PMS include.[5]

•   Estrogen excess, estrogen and /or progesterone deficiency and rapid shift of balance of ovarian hormones after ovulation.

•   Women with PMS often have an exaggerated response to normal hormonal changes, although their levels of estrogen and progesterone are similar to those of women without PMS, rapid shifts in levels of these hormones promote pronounced emotional and physical responses

•   Serotonin deficiency.

•   Magnesium, calcium deficiencies as nutritional causes of PMS;supplementation show improvement in physical and emotional symptoms

•   Endorphins, alterations in (GABA) system.

•   B6 deficiency, changes in glucose metabolism, fluid-electrolyte imbalances.

Correlation does not imply causation. Some suggest that childhood stress is caused by precocious puberty recognized later, rather than being the cause of it.

A 2011 study shows each 1 kg/m² increase in childhood BMI expected to result in a 6.5% higher absolute risk of early menarche <12 years.[14,15,16]

Early menarche is associated with early onset of ovulatory cycles but the frequency of ovulation is related to both time since menarche and age at menarche. When the age at menarche is younger than 12 years, 50% of cycles are ovulatory in the first gynecologic year (year after menarche).[21,22,23,24]

By contrast, it may take 8 to 12 years after menarche until females with later-onset menarche are fully ovulatory.

Changes in EEG in women during menstrual cycle.[3]

The mean alpha-frequency showed cyclic changes, slower α-waves during follicular phase and faster α-waves during luteal phase.

Ovarian hormone fluctuations correlate with changes in energy balance in women. Compared to follicular phase energy expenditure and food intake is increased in luteal phase.[4] Majority of energy is consumed in the resting – but awake – brain at glutamatergic synapses, EEG signals represent synchronous activity of glutamatergic synapses, and fluctuations in ovarian hormones determine energy expenditure and food intake in women.

Resting alpha frequency is a predictor for cognitive performance, menstrual cycle-dependent changes in alpha activity have functional consequences in performance.[9] Noticeably, alpha frequency is lower in late follicular phase compared to early follicular phase or luteal phase. Early follicular phase and luteal phase have in common that levels of estradiol or progesterone are either low (early follicular phase) or high (luteal phase), but ratio of estradiol to progesterone same. In late follicular phase, estradiol is elevated, but progesterone is low. Thus, the ratio of estradiol to progesterone is high.

PMS affects women with ovulatory cycles and completely resolves at menopause.

This supports theories of cyclic hormonal changes of normal ovulatory cycles as cause of PMS.

The working of brain is a function of the status of

ovarian hormones.[19,20]

Experiments show mechanisms by which ovarian hormone levels regulate nervous system function. During menstrual cycle when progesterone is highest, level of nerve-cell GABA receptor subtype delta was high. These receptors are inhibitory, neurons with more delta receptors fire less. During the cycle when estrogen levels are higher than progesterone levels, the number of delta receptors decrease, increasing nerve cell activity, in turn increasing anxiety and seizure susceptibility.[13]

Changes in frequency of ongoing alpha oscillations and food intake across the menstrual cycle are in parallel. Studies demonstrate a decrease in food intake during the periovulatory, but an increase in the luteal phase. The human brain weighs 2% of the total body weight, but consumes 20% of the bodies resting energy budget. More than 90% of cortical synapses are glutamatergic.[2]   In the brain, glutamatergic synapses are the dominant ATP consumers with an estimated 60% to 80% of the energy used by intrinsic brain activity.[1]

Increase in glutamatergic activity predicts accelerated ATP consumption. If an increase in estradiol is coupled to a decrease in food consumption, a decline in alpha frequency saves energy because synapses are activated less frequently.

Laboratory Studies: At present, there are no laboratory studies that reliably assist in the diagnosis of PMS.

MANAGEMENT

Medical care of PMS is primarily pharmacologic and behavioral, with an emphasis on relief of symptoms.

No single pharmacologic treatment is universally effective, and studies with all therapies have not produced consistent results. Current recommendations in the literature regarding oral contraceptive pills are conflicting.[8]

CONCLUSION

Adolescent girls frequently encounter problems with weight , mood changes, lethargy , tiredness, difficulty in concentrating on studies, changes in appetite, insomnia, breast tenderness, etc.,

They have less knowledge of PMS and its symptoms and begin to feel depressed.

In this study of 100 girls in the age group of 17-19yrs , 87 with PMS showed that early onset of menarche (11-12yrs) in 74 of them showed early onset of PMS (72 with >4yrs since menarche) ,out of which 69 could record ovulation indicators. BBT recorded in study group 52 showed rise in temperature up to $1°F$, 4-5 days before the next expected period.

With age at menarche <12 years, study group recorded 93.24% of positive ovulation indicators and 70.27% of BBT rise of $1°F$ which shows the PMS and it's relation to ovulation because of consequent hormonal (estrogen and progesterone changes in a menstrual cycle) fluctuations.

Resting alpha frequency is a predictor for cognitive performance

Alpha activity (increased α- activity) findings in this study in 85.05% of PMS subjects supports previous studies findings of mean alpha-frequency cyclic changes and experiments   that showed possible mechanisms by which levels of ovarian hormones might regulate nervous system function.

Studies reveal correlation between the effect of estrogen, progesterone, and brain signals captured in the form of α, β, θ and δ by EEG recordings.

These symptoms were related to the menstrual cycle in the classical temporal PMS pattern. The complaints of the person revolved to a large degree around and after ovulation, when estrogen progesterone levels shift.

Association of PMS with cyclic hormonal changes is established.

PMS, exhibits symptoms which are highly variable among individuals. It can best be regarded as a condition of dysregulation for which cyclic hormonal variations provide the stressor.

This study demonstrates successful approach toward identification of unexplained complaints in adolescent girls and their phobias and to correct and educate them about normal physiology of cyclic hormonal changes and their effects.

A simple questionnaire was prepared to elicit response on awareness of PMS among the study group and parents.

Table 6: Item wise responses of subjects regarding knowledge of PMS (n=100)

S.no	Items	Agree n%	Uncertain n%
1.	Do they agree that knowledge about PMS saves unnecessary worrying and medication for vague symptoms.	91%	9%
2.	Parents should pay attention to adolescent girls and give emotional support.	61%	39%
3.	Are they aware that other girls also could be having similar problems.	22%	78%
4.	Do they think that everyone should disclose correct information about their health.	42%	58%

Of the 100 responses 91% agreed that knowledge about PMS would help understanding the physiological aspects of PMS and save from inappropriate medication and their undesirable side effects.

Conflict of Interest: None

Source of Support: Self

Ethical Clearance: Ethical clearance obtained from NIMS, Hyderabad DR NTR UHS,Vijayawada.

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A Study on Prevalence of Metabolic Syndrome among South Indian Urban Young Adults

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ABSTRACT

Aim: To assess the prevalence of Metabolic Syndrome in young adults.

Materials and Method: The study was conducted in Coimbatore Medical College hospital, Coimbatore. A total of 250 apparently healthy individuals attending Master health check-up clinic were selected for the study. Anthropometric measurements and resting blood pressure were taken with detailed clinical history. A fasting lipid profile and fasting blood sugar values are taken and estimated using a colorimeter.

Results: The prevalence of metabolic syndrome among young adults is 22.8%. The metabolic syndrome is becoming increasingly common in children and young adults. With more than 50,000,000 people with the diagnosis of metabolic syndrome in the United States, it is a massive public health problem world-wide.

Keywords: *Metabolic syndrome, young adults, body mass index, lipid profile, blood pressure.*

INTRODUCTION

Metabolic Syndrome consists of a group of abnormalities that confers increased incidence of cardiovascular disease and Diabetes Mellitus. Although the first description of the metabolic syndrome occurred in early twentieth century, the worldwide overweight/ obesity epidemic has been the driving force for the more recent recognition of the syndrome[1].

Tamilnadu is undergoing a socio economic and nutrition transition especially in large cities, like Coimbatore, where lifestyles are becoming more sedentary with lower levels of physical activity, and diets are more energy dense with higher fat content, leading to about threefold increase in the prevalence of overweight / obesity.

The emergent epidemic of obesity in adolescents makes metabolic syndrome and its sequelae an important condition to be studied among the present young adults.

MATERIALS AND METHOD

Design of the study:

It is a prevalence study.

A total of 250 Apparently healthy individuals subjects attending Master health check- up clinic (20 to 40 years) were included in the study. The health status of the subject was determined by thorough clinical examination and history taking.

The study was initiated with the approval of Institutional ethics committee. The study was carried out after explaining the procedures in detail and getting informed consent from the subjects.

The experimental protocols involved are,

1) Recording of a detailed history including family history of Diabetes, Hypertension, Cardiovascular disease and history of smoking.

2) Measurement of Anthropometric Indices:

a. **Body Mass Index (BMI)** was computed as the weight in kilograms divided by the square of the height in meters using Quetelet's Index[2].

b. **Waist circumference** was measured to the nearest 0.5 cm with a non-elastic inch tape at a point midway between the lower rib margin and the iliac crest

at the end of normal expiration with the subject in standing position[3].

c. Hip circumference was measured at the level of greater trochanter.

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

3) Measurement of Blood pressure:

4) Blood investigations

a. Fasting Plasma Glucose.

b. Fasting Lipid profile.

Fasting plasma glucose was estimated by glucose oxidase peroxidase (GOD-POD) method.

Lipid profile was done by fully-auto analyzer (ERBA -XL-300)[4].

Currently, two sets of defining criteria for metabolic syndrome are set out by two different sources: The International Diabetes Federation (IDF) and the revised National Cholesterol Education Program Adult Treatment Panel III (2001)[2,7] (NCEP-ATP-III). These are very similar and they identify individuals with a given set of symptoms as having metabolic syndrome. There are two differences, however: the IDF definition states that if body mass index (BMI) is greater than 30 kg/m², central obesity can be assumed, and waist circumference need not be measured. However, this potentially excludes any subject without increased waist circumference, if BMI is less than 30. Conversely, the NCEP definition indicates that metabolic syndrome can be diagnosed based on other criteria also. The IDF uses geography-specific cut points for waist circumference, while NCEP-ATP-III uses only one set of cut points for waist circumference regardless of geography. These two definitions are much more similar than the original NCEP- ATP-III and WHO definitions.

The US National Cholesterol Education Program Adult Treatment Panel III (2001)[2,7] requires at least three of the following:

NCEP: ATPIII 2001 CRITERIA FOR THE METABOLIC SYNDROME:

• **NCEP:ATPIII 2001 – Three or more of the following**:

• Central Obesity: Waist circumference >102cm (M), >88cm(F).

• Hypertriglyceridemia: Triglycerides≥150mg/dl or specific medication.

• Low HDL cholesterol :< 40 mg/dl and <50 mg/dl respectively, or specific medication.

• Blood pressure ≥ 130/85 mmHg

• Fasting plasma glucose ≥ 100mg/dl or specific medication or previously diagnosed type 2 diabetes.

In part because of its relative simplicity for clinical purposes, the ATP guidelines appear to be in widest use.[2]

The International Diabetes Federation (IDF) consensus worldwide definition of the metabolic syndrome (2006)[8,9]is: Central obesity (defined as waist circumference[#] with ethnicity-specific values) AND any two of the following:

 # -- Waist Circumference

IDF Criteria for Central Adiposity

Men	**Women**
Ethnicity	
d94cm	≥80cm
Europian, Sub-Saharan African,	
Eastern& Middle Eastern.	
d90cm	≥80cm
South Asian, Chinese, and ethnic	
South & Central American.	
d85cm	≥ 90cm
Japanese.	

Two or more of the following:

• Fasting triglycerides > 150mg/dl or specific medication.

• HDL cholesterol < 40 mg/dl and <50 mg/dl for men and women respectively, or specific medication.

• Blood pressure >130 systolic or >85 mmHg diastolic or previously diagnosed as hypertension or on specific medication.

• Raised fasting plasma glucose (FPG): >100 mg/ dL (5.6 mmol/L), or previously diagnosed type 2 diabetes.

RESULTS

Table: 1: BASELINE CHARACTERISTICS OF SUBJECTS

WC	82.7± 10.97
WHR	0.89± 0.10
SBP	123± 16.9
DBP	80.2 ±11
FBS	95.6± 20
TGL	143± 47
HDL	40± 10

Table: 2: PREVALENCE OF METABOLIC SYNDROME ACCORDING TO NCEP –ATP-III CRITERIA

AND IDF CRITERIA.

Metabolic Syndrome	
NCEP Criteria	57 (22.8%)
IDF Criteria	114 (45.6%)

Table: 3: GENDER DIFFERENCE IN PREVALENCE OF METABOLIC SYNDROME ACCORDING TO IDF CRITERIA

Gender	Metabolic Syndrome		Total
	Present	Absent	
Males	41	89	130
Females	58	62	120
Total	99	151	250

'P' Value = < 0.005*

The prevalence of Metabolic syndrome in females is significantly higher than in males according to IDF criteria.

Table-4: Comparison of variables between males and females

Variables	Males	Females	't' value	'p' value
BMI	25.4±4.9	26.6±1.8	0.723	0.47
WC	83.6±10.5	81.7±11.3	1.391	0.165
FBS	94.6±17	96.8±23.8	0.166	0.01*
TGL	145±45	142±48	0.478	0.63
HDL	41±12	39±9	1.228	0.221
Diastolic BP	81±11	79±11	1.1	0.25
Systolic BP	124±17	122±16	0.9	0.35

STATISTICAL SOFTWARE

Statistical analysis was performed with a SPSS programme version 16. Microsoft word and excel have been used to create tables, charts, graphs etc., 'p' value < 0.05 was considered as statistically significant.

DISCUSSION

The present study shows a high prevalence of Metabolic syndrome, affecting   nearly 1/3rd of the study population. The prevalence of Metabolic Syndrome among young adults was estimated by using both IDF and ATP-III criteria and overall prevalence rates were found to be 36.2% and 18.4% respectively. Higher prevalence by using IDF criteria can be explained by the lower cut-off points adopted by this new definition. In IDF criteria, central obesity is the major criterion, its cut off is ethnic specific and is lower for Indians than used by original ATP-III. Another difference among two definitions is lower cut off for fasting blood sugar by IDF, which is > 100 mg/dl as compared to >110 mg /dl in ATP-III. The higher prevalence by new IDF definitions is comparable with other reports.

In India very few studies had been done to find prevalence of Metabolic syndrome and most of the studies which are available in literature had used ATP-III[10].   But Deepa et al[5] compared the prevalence of Metabolic syndrome in south Indian population by various definitions and found that by IDF 25.8% individuals more than 20 years of age were having Metabolic syndrome as compared to 18.3% by ATP-III. Another study from Bangalore by Kanjlalet al[6] concluded that prevalence of Metabolic syndrome by ATP-III was 40.3% as compared to 34.9% by IDF definition.

In the present study, prevalence of Metabolic syndrome is around 22.8%. Due to the difficulty of curing obesity and overweight in adults and the many long-term effects of childhood obesity, the prevention of childhood obesity has been recognized as a public health priority. Reduced levels of physical activity lead to low energy expenditure affecting resting metabolic rate and total energy expenditure. The young adults are also fond of eating junk food containing more amount of fat than carbohydrate and protein. Fat is less satiating than carbohydrate and dietary fat is stored

more efficiently than carbohydrate or protein which finally results in obesity or overweight. Similarly irregular food intake   deleteriously affects nutritional health, reduces energy levels and promotes the consumption of high caloric food later in the day.

Overall our study suggests that increased prevalence of metabolic syndrome and its components could be attributable to urbanization, physical inactivity and genetic predisposition. The genetic change includes, fat mass and obesity gene may be associated with conversion of unspent calories to abdominal fat.   In populations traditionally exposed to heavy exercise and strenuous activity in former agro economies which have   now rapidly changed their life to urban technologies with sedentary living.

Although the pathogenesis of the metabolic syndrome remains unclear, the metabolic syndrome in its early stages, by mild and varying degree of abnormalities of insulin, glucose and lipid metabolism, which if unchecked, may progress over years to overt diseases such as diabetes and atherosclerosis in its various manifestations. Physical activity   may protect against diabetes and cardiovascular disease and individual components of the metabolic syndrome. In intervention studies, physical exercise has, in variable degrees and at least in the short term, decreased weight and visceral fat accumulation, increased HDL cholesterol and decreased triglyceride levels, decreased blood pressure and improved insulin sensitivity.

CONCLUSION

The prevalence of metabolic syndrome among young adults with physical activity is 22.8%. The metabolic syndrome is becoming increasingly common in children and young adults. It is a massive public health problem world- wide. Appropriately, provisions of healthy food options and physical activities for young adults are at the fore front of public health initiatives to curb an obesity pandemic. Our study showed influences of sedentary behavior and physical activity on prevalence of obesity and metabolic syndrome.

Meanwhile it is important to develop and implement public health policies to control the epidemic of increasing cardiovascular risks and metabolic syndrome in India.

The first-line treatment is change of lifestyle. Generally, the individual disorders that compose the metabolic syndrome are treated separately.

Conflict of Interest: Nil

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Comparative Study of Serum Magnesium Level in Type 2 Diabetic Patients with and Without Foot Ulcer

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ABSTRACT

Introduction: Diabetic foot ulceration affects 15% of all diabetic individuals during their lifetime and is clearly a significant risk factor in the pathway to limb loss[1] Diabetes Mellitus has been found to be associated with significant reduction in the serum magnesium level. Hypomagnesaemia is found to be associated with development of neuropathy and abnormal platelet reactivity, the two main factors involved in the pathogenesis of foot ulcer[2].

Aim: To study the association of Hypomagnesaemia in Type 2 diabetes with & without foot ulcers as compared to controls.

To analyze the association of serum magnesium level with the duration of diabetes and Glycemic control.

Materials and method: This study was carried out in the Department of Diabetology , Kilpauk Medical College in 3 groups: Group A: Type 2 Diabetes mellitus with foot ulcers(n=30).Group B: Type 2 diabetes mellitus without foot ulcers (n=30). Group C: Healthy volunteers (n=20). Estimation of serum magnesium was done by Calmagite dye method in Dept of Biochemistry, Kilpauk Medical college.

Result: Serum magnesium level in diabetic population was significantly low in comparison to controls. In particular diabetic patients with foot ulcer had the lowest level in serum magnesium. There was negative correlation between fasting blood sugar and serum magnesium in diabetic patients. Duration of diabetes and serum magnesium were inversely related.

Conclusion: Hypomagnesia is an important risk factor in the pathogenesis of foot Ulcer. There is strong association between poor Glycemic control & Hypomagnesaemia .Reduced serum magnesium level may have an adverse bearing on the complications such as foot ulcers & morbidity in patients with diabetes. Reduced serum level could be an early predictor of the course and complications of diabetes.

Keywords: *Hypomagnesimia, Type 2 Diabetes, foot ulcer, Glycemic control.*

INTRODUCTION

Type 2 diabetes mellitus is a worldwide health crisis. One third of all diabetic patients have significant peripheral neuropathy and/or peripheral vascular disease - the main risk factor for foot ulceration. Diabetic foot problems are the most common causes of hospitalization in diabetic patients and it imposes heavy financial burden on the health care system. There are several studies on the role of trace elements like magnesium deficiency in the etiology of diabetes and its complications. The probable cause of Hypomagnesaemia in Diabetes are decreased Magnesium intake ,enhanced renal loss, reduced renal reabsorption.

Magnesium is an essential intracellular cation which serves to regulate intermediary metabolism by acting as a Co-factor for ATP activating many rate limiting enzymes. Magnesium deficiency leads to impairment of insulin action, worsening of insulin resistance and development of diabetic complications[3].Many studies have reported

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the association between hypomagnesemia and adverse complications of type 2 Diabetes like coronary artery disease, hypertension, diabetic retinopathy, nephropathy, neuropathy and foot ulcerations.

MATERIALS AND METHOD

This study was conducted on 30 cases of Type 2 Diabetes mellitus with foot ulcer(foot ulcer of any size present for atleast 3 months in one or both foot), 30 cases of type 2 Diabetes mellitus without foot ulcers and 20 healthy volunteers of both sexes with age group ranging from 50 – 69 years from the out patients of Department of Diabetology, with due permission of the Head of the Department and the Dean, Kilpauk Medical College Hospital, written consent was obtained from all the subjects. Ethical clearance was obtained. Detailed history was taken and clinical examination was done. Serum magnesium estimation was done by Calmagite dye method by semi-auto analyzer in department of Bio-chemistry Kilpauk Medical College. The Lab investigations ,fasting blood sugar and urine routine were done in the Department of Biochemistry, Kilpauk Medical College hospital.

RESULTS AND OBSERVATIONS

The different parameters were analyzed using one way ANOVA F-test, Bonterferoni t-test, Chi-square test, student t-test and correlations were analyzed by Pearson Correlation Coefficient. In our study on diabetic patients with foot ulcers there were 19 males and 11 females, with mean age of 61.05. In diabetic patients without foot ulcers there were 17 males and 13 females with mean age of 58.17. In control group there were 11 males and 9 females with mean age of 60.05.

There was statistically significant variation in the level of serum magnesium between the controls (mean – 2.35meq/L), DM without foot ulcers (Mean – 1.95 meq/L) and DM with foot ulcers (Mean – 1.67 meq/L). The level of serum magnesium was lower in DM without foot ulcer and lowest in DM without foot ulcers when compared to the control (Table 1).

TABLE-1: COMPARISON OF SERUM MAGNESIUM

	N	Serum. Magnesium		Oneway ANOVA F-test	Multiple comparison by Bonferroni t-test
		Mean (Meq/L)	Std Deviation		
Control	20	2.3520	.114	F=216.3 P=0.001 significant	1 & 2, 1 & 3, 2& 3 significant
DM with Foot ulcer	30	1.6700	.082		
DM without Foot ulcer	30	1.9550	.137		

In groups DM with foot ulcers and without foot ulcers there was negative correlation between fasting blood sugar and serum magnesium levels ie) higher the fasting blood sugar level lower the serum magnesium level (Table 2).

TABLE-2: CORRELATIONS BETWEEN FASTING BLOOD SUGAR & SERUM MAGNESIUM

Group			Serum Magnesium
DM with Foot ulcer	blood sugar	Pearson Correlation	-.885(**)
		Sig. (2-tailed)	.001
		N	30
DM without Foot ulcer	blood sugar	Pearson Correlation	-.618(**)
		Sig. (2-tailed)	.001
		N	30

** Correlation is significant at the 0.01 level (2-tailed).

There was an inverse relationship between the duration of diabetes and serum magnesium levels,(ie) longer the duration of diabetes lower, the serum magnesium level. This observation was statistically significant.

Table 3: CORRELATION BETWEEN DM DURATION AND SERUM MAGNESIUM

Group			Serum Magnesium
DM with Foot ulcer	DM duration	Pearson Correlation	-.228
		Sig. (2-tailed)	.199
		N	30
		Sig. (2-tailed) N	.000 30

** Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Magnesium depletion has shown to have a negative impact on glucose homeostasis and insulin sensitivity in patients with Type 2 diabetes. The impairment of insulin sensitivity may be related to a defective tyrosine kinase activity of the insulin receptor. Also in human nondiabetic subjects, low plasma Mg has been associated with relative insulin resistance, glucose intolerance, and hyperinsulinemia[4] (Rosolova et al 1997). Relationship between Mg deficiency and insulin resistance is a vicious circle. Low Mg status contributes to the development of insulin resistance, which in turn attenuates Mg uptake in insulin sensitive tissues[5].

More than 30% of ambulatory diabetic patients without renal insufficiency were hypomagnesemic on a multifactorial basis[6]. The main cause appears to be increased urinary loss accompanying glycosuria induced osmotic diuresis .In this study, it was observed that the mean serum magnesium level was low (1.95 meq/l) in diabetic patients in comparison to control subjects (2.35 meq/l). This indicates the association of hypomagnesemia with diabetes mellitus. These results were in accordance with the observation of Stutzman and Amatuzia[7], Jackson and Meier[8], Jain et al[9], Mc Nair et al and Vyas et al[10]. All had reported strongly association of hypomagnesemia with diabetes mellitus. The mean serum magnesium in cases with foot ulcers was 1.67 meq/l which was much lower than those without foot ulcer 1.95 meq/l. These findings are in accordance with those of Rodriguez Morann[2] in which there was strong relationship between serum magnesium depletion and the presence of foot ulcers.

Magnesium is an effector of inositol transport. It increases the affinity of the transporter for inositol. Hypomagnesemia causes a decrease in the affinity of the inositol transport protein for inositol. Decreased levels of intracellular myoinositol lead to reduced phosphoinositide

synthesis and decreased production of diacylglycerol. This in turn impairs Protein kinase C activation and may lead to decreased Na^+/K^+ ATPase activity.

In nerve, the inhibition of Na^+/K^+-ATPase activity may reduce Na^+ extrusion and therefore lead to increased intracellular Na^+ concentration which on its part inhibits depolarization and slows nerve conduction rate. It was postulated that polyol pathway hyperactivity could be the mechanism linking hyperglycemia to neuropathy.

Activation of polyol pathway also may promote oxidative stress by depleting NADH, a cofactor for both aldose reductase and glutathione reductase which lead to a decrease in reduced glutathione and increase in oxidized glutathione. Reduced glutathione is an important scavenger of reactive oxygen species, thus the decrease in reduced glutathione may induce or exacerbate intracellular oxidative stress.This allows hypomagnesemia and the polyol pathway to be rationalized into a single mechanism for the aetiology of diabetic complications[11].

In this study there was negative correlation between fasting blood sugar and serum magnesium in diabetic patients. Jackson and Meier[11] also had observed that hypomagnesemia was commonly associated with poor control of diabetes specially when the fasting blood sugar was more than 180 mg %. Thus it was observed that a strong association exists between hypomagnesmia and duration of diabetes and poor glycemic control. In particular, Diabetic patients with foot ulcers had the lowest levels of serum magnesium, indicating that hypomagnesemia is important risk an factor in the pathogenesis of foot ulcers.

CONCLUSION

In our study there is strong association between hypomagnesaemia and Type 2 Diabetes mellitus, The serum levels of magnesium were significantly lower in

patients with food ulcers than those without foot ulcers. There is strong association between poor glycaemic control and hypomagnesaemia. Duration of diabetes and serum magnesium was inversely related. The reduced serum magnesium level could be an early predictor of the course and complications of diabetes mellitus. So it is prudent to monitor serum magnesium level in the diabetic population and treat the condition appropriately. The treatment of the patients with diabetes requires a multidisciplinary approach whereby every potential complicating factor , such as serum mg, must be monitored closely and treated. Further large series observational and interventional studies are necessary to establish the facts of current study.

Conflict of Interest: Nil.

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Effect of Head UP and Head Down Tilt on Heart Rate Variability in Females

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ABSTRACT

Cardiovascular autonomic function can be assesed by the orthostatic stress. This is done mainly by Head Up Tilt (HUT) testing and Head Down Tilt (HDT)Testing. The parameters which represent the cardiovascular autonomic function involved the Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP) and Pulse Pressure (PP). Heart Rate Variability (HRV) indices provide non-invasive assessment of cardiovascular control mechanisms. Low Frequency (LF) is an indicator of sympathetic system. High Frequency (HF), an index of parasympathetic and the ratio LF/HF is the specific and quantitative index of sympathovagal balance. **Method:** Hundred healthy females in the age group of 18-45 years were selected to evaluate the effect of HUT and HDT on Heart Rate Variability(HRV). LF, HF and LF/HF were recorded at supine , 30^0, 60^0, 80^0HUT and 30^0, 60^0 80^0 HDT. In each position the HR was determined by recording the ECG for 5 min in lead II. Niviquire software was used to measure the LF, HF and the LF/HF ratio. **Results :** On HUT LF and the LF/HF ratio increased and HF decreased. On HDT the LF,HFand the LF/HF ratio decreased in females. **Interpretation and Conclusion:** During HUT there is increase in sympathetic activity (increase in LF and LF/HF ratio). On HDT there is decrease in the sympathetic activity which is indicated by decrease in the LF and the LF/HF ratio. Postural stress test is useful for medical students, physiologists and clinicians to understand cardiovascular reflex response in healthy or diseased individuals.

Keywords: Autonomic nervous system; Head Up Tilt ;Head Down Tilt ;Heart Rate Variability.

INTRODUCTION

Tilt table test is a standardized, physiological, clinically relevant stimulus that challenges the cardiovascular regulation.[1] Passive head-up tilt and head down tilt result in specific changes in the spectral characteristics of heart rate variability as a result of reduced vagal and enhanced sympathetic outflow.[2] In healthy subjects, time and frequency domain analysis of heart rate variability are most commonly used non-invasive methods to evaluate autonomic regulation of heart rate. Changes in frequency components were found to be an index of autonomic nerve activity.[3] Mixed autonomic responses to postural stress, which are thought to be mediated by both cardiopulmonary and arterial mechanisms, can be distinguished by changes in frequency components of heart rate variability.[4] In this study we will investigate the differences in cardiovascular autonomic adjustments to postural stress by employing graded head up tilt and head down tilt in females.

In 1995 Montano N. analyzed the HRV during graded orthostatic tilt. He studied in 22 healthy volunteers. The HUT angles were 15, 30, 45, and 90 degrees. Continuous ECG was recorded. There was a progressive increase in the LF of HRV on HUT.[5] The responses of the frequency components of HR and BP variability, to progressive changes in autonomic activity induced by graded head-up tilt technique in 12 normal subjects was studied. During 30^0 tilt, R-R interval was unchanged and the amplitude of the

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HF component of HRV showed only a slight insignificant decrease. The amplitude of LF component of HRV increased progressively as the angle increased.[6] Sex related difference in autonomic modulation of HR in middle aged subjects was studied. LF component of HRV measured from ECG recordings was lower in women, where as the HF was higher in women than in men. The ratio between LF/HF was lower in women. The increase of LF and decrease of HF component of HRV in response to an upright posture were smaller in magnitude in women than in men. It was concluded that the baroreflex responsiveness were attenuated in middle aged women when compared with men, but the tonic vagal modulation of HR was augmented.[7] Cerebral autoregulation during acute HDT was studied. Systolic arterial pressure spectral power of the LF decreased from 5.7 ± 1.6 to 44 ± 1.6 mmHg^2 HDT and mean arterial pressure spectral power of the LF decreased from 3.3 ± 0.79 (supine) to 2.0 ± 0.38 mmHg^2 (HDT). HDT did not affect cerebral blood flow velocity.[8] HRV was affected by age and sex. Time and frequency domain analysis by Holder recording were done .HRV measures were highly consistent with time with correlation of 0.76 – 0.80 for HF and total power. Total power declined with age by 45% in men and 32% in women and was lower by 24% among women than among men ($p \leq 0.005$). Men had a 34% higher very low and LF power and a higher ratio of LH/HF. Conversely HF in women represents a greater proportion of total power than in men. Strong age and sex effects were evident in this study. HRV derived from short recordings can be informative in population based studies.[9]

METHODOLOGY

100 female subjects between the age group of 15-45 years are selected from general population randomly. The subjects were informed about the procedure which had to be followed by them. Consent was taken. The study was conducted before lunch between 12 noon to 2 pm. After the completion of procedure fruit juice was offered to all subjects.

Inclusion Criteria:

• Normal healthy females aged 15-45 years

Exclusion Criteria:

• Obese

• Alcoholics

• Smokers

• Hypertensives

• Age below 15 and above 45 yrs

• Subjects taking any medication

• Subjects suffering from any medical illness.

• Women taking oral pills

• Menstruating women

• Diabetic individuals

METHOD OF COLLECTION OF DATA

100 female subjects between the age group of 15 to 45yrs were selected randomly from general population. A pretested structured proforma was used to collect the relevant information. Subjects were familiarized with HUT and HDT procedure.

Preparation for Tilt Table Test (TTT) :

Generally, there was no eating or drinking 4-6 hours prior to the test to limit symptoms of nausea / vomiting. Manually operated tilt table with foot plate support is used. Additional straps are applied at the level of knee, waist and shoulders. The metal arc is attached to the table where holes are made at various angles. The table is locked at particular angles by the iron rod. The angles used were 30^0, 60^0, 80^0 for HUT and 30^0, 60^0, 80^0 for HDT.ECG leads were fixed at right arm, left arm, left foot and right foot. ECG recordings were observed over the monitor. When normal lead II ECG was obtained, these recordings were saved for a duration of 5 minutes. In supine position Pulse rate is recorded by 5 min ECG. The table is tilted to 30degree, 60degree and 80degree HUT position . Before the change in the tilt angle the subject was brought to the supine position for 5 mins rest. The subject was asked for any symptoms such as nausea, sweatiness, pallor, light headedness, palpitation and fainting. Frequency domain analysis was done by using Niviqure software. Same procedure is done in HDT position.Repeated measures ANOVA will be used for analysis at different tilts. Followed by Tukeys post hoc test and paired 't' test.

RESULT

Low frequency (LF)

On HUT the LF values in females were 0.2 ± 0.1, 0.3 ± 0.1 and 0.4 ± 0.1 at 30^0, 60^0 and 80^0 respectively (Table 1).on HDT the values were 0.01 ± 0.0, 0.001 ± 0.01 and 0.001 ± 0.01 at 30^0, 60^0 and 80^0 of tilt respectively (Table 2). There was a increase in low frequency value with head

up tilt. The LF decreased on HDT.

High Frequency (HF)

The high frequency on HUT value in females were 0.3 ± 0.1, 0.3 ± 0.1 and 0.2 ± 0.1 at 30^0, 60^0 and 80^0 respectively, (Table 1).On HDT the values in females were 0.2 ± 0.1, 0.2 ± 0.2 and 0.1 ± 0.1 at 30^0, 60^0 and 80^0 respectively. (Tables 2). There was a decrease in high frequency with head up tilt . Also showed statistically a significant decrease ($p < 0.05$) at 30^0, 60^0 and 80^0 head down tilt position.

LF /HF ratio

On head up tilt the mean ratio value is 0.3 ± 0.1, 0.6 ± 0.5 and 0.7 ± 0.2 at 30^0, 60^0 and 80^0 respectively (Table 1).On Head down tilt the values were 0.6 ± 1.1, 0.5 ± 1.3 and 0.2 ± 0.1 at 30^0, 60^0 and 80^0 of tilt respectively (Table 2) With head up tilt there was increase in the LF/HF ratio .On head down tilt there was decrease in the LF/HF ratio .

DISCUSSION

The slight change in the low frequency to high frequency ratio confirms that immediate responses to head up tilt and head down tilt reflects the autonomic nerve activity. Hence, changes in the frequency components were found to be an index of autonomic nerve activity and they explained the individual differences observed in the ability to control heart rate during a transition to upright posture and head down tilt.[2,10]

Low frequency and posture :

Low frequency component of the heart rate variability has been reported to be a marker of sympathetic system . On standing, about 300 to 800 mL of blood is forced downward to the abdominal area and lower extremities. Within seconds of this sudden decrease in venous return, pressure receptors in the heart, lungs, carotid sinus and aortic arch are activated and mediate an increase in sympathetic outflow and increase in low frequency on head up tilt. Similar findings were reported by Mukai

S[12] and Mikko P[11].With head down tilt the low frequency component decreases in . There was significant decrease in the low frequency value ($p < 0.001$). This decrease was mainly due to decrease in sympathetic activity.

High frequency and posture :

High frequency component of the heart rate variability indicates the vagal modulation of heart rate.In our study the high frequency decreased with head up tilt. This value showed significant decrease ($p < 0.001$).The decrease in the high frequency component on head up tilt and head down tilt was mainly due to decrease in the vagal tone. Similar findings were observed by Mikko P. Tulppo[11], Lt Col KK Tripathi[12] and Jahan et al[13].

Low frequency to high frequency ratio and posture :This ratio indicates sympatho vagal balance. In our study the low frequency to high frequency ratio increased with head up tilt in females. This value showed significant increase ($p < 0.001$). In the present study the ratio increased with gradual increase in the head up tilt.

In our study the low frequency to high frequency ratio decreased with head down tilt . This value showed significant decrease ($p < 0.001$). In the present study the ratio decreased with gradual increase in the head down tilt. Similar findings were observed by Porta[14].On head up tilt the increase in low frequency and decrease in high frequency increased the ratio and on head down tilt the decrease in high frequency and low frequency decrease the ratio. Low frequency component of HRV increased progressively as the angle increased ($p < 0.005$). During high level tilt the high frequency amplitude of heart rate variability decreased progressively with tilt angle. The low frequency amplitude of heart rate variability peaked at a tilt angle of 30^0. The ratio increased with head up tilt. This result suggested that mixed autonomic responses to orthostatic stress, which are thought to be mediated by both cardiopulmonary and arterial baroreflex mechanisms, can be distinguished by changes in the frequency components of heart rate. Similar findings were observed by Jahan et al[13].

TABLE – 1 : Heart rate variability response to HUT in Females

Parameters	Supine		30 Deg		60 Deg		80 Deg	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
LF(Hz)	0.1	0.0	0.2	0.1	0.3	0.1	0.4	0.1
HF (Hz)	0.3	0.1	0.3	0.1	0.3	0.1	0.2	0.1
LF/HF	0.2	0.1	0.3	0.1	0.6	0.5	0.7	0.2

TABLE – 2 : Heart rate variability response to HDT in Females

Parameters	Supine		30 Deg		60 Deg		80 Deg	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
LF (Hz)	0.1	0.0	0.01	0.0	0.001	0.1	0.001	0.1
HF (Hz)	0.3	0.1	0.2	0.1	0.2	0.2	0.1	0.1
LF/HF	0.8	1.4	0.6	1.1	0.5	1.3	0.2	0.1

CONCLUSION

This study concluded that with head up and head down tilt there are changes in the cardiovascular parameters . Heart rate variability will help us to assess these changes.In conclusion, cardiovascular reflex effects can be assessed using various postural stress tests effectively for physiological and clinical investigations in the field, by the patients bed side, or in the laboratory using more elaborate equipment. Physiologists, clinicians and medical students can make use of these tests to assess or understand cardiovascular reflex response in man in health or disease.

Conflict of Interest- Nil

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Study of Autonomic Nervous System Activity based on Gender Differences

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ABSTRACT

The present study was conducted on 200 medical students in the age group of 17 – 25 years. They were allocated into two groups: Group 1 comprised of young healthy males. Group II comprised of young healthy female and this group underwent two phases of examination: First examination was done during late follicular phase between 10th to 13th day (Group IIA) and the second examination was done during mid luteal phase between 17th to 22nd day (Group IIB) of ovarian (menstrual) cycle. Autonomic function testing to assess sympathetic and parasympathetic activity was done.

The finding of the present study indicated that there is marked difference in autonomic functions in males and females and these differences vary with the phase of menstrual cycle of females. This study revealed that there is predominant sympathetic activity in males compared to females whereas there is significant parasympathetic activity in females during late follicular phase compared to males. However, parasympathetic activity was reduced while sympathetic activity was increased in females during mid luteal phase.

Keywords: *Autonomic function tests, Sympathetic activity, Parasympathetic activity, Sex hormones.*

INTRODUCTION

The autonomic nervous system is an extensive neural network whose main role is to regulate the milieu interieur by controlling homeostasis and visceral functions[1]. Although most functions regulated by the ANS are out of conscious control, but emotions and somatosensory inputs profoundly influence the ANS.

Differences in the autonomic system activity may be due to differences in afferent receptor stimulation, in central reflex transmission, in the efferent nervous system and in post synaptic signaling. At each of these potential sites of difference, there may be effects due to different size or number of neurons, variations in receptors, differences in neurotransmitter content or metabolism as well as functional differences in the various components of the reflex arc[2].

Gender differences in the autonomic nervous system may be present because of developmental differences or due to the effect of prevailing levels of male or female sex hormones. Such prevailing hormone levels may also produce differences between pre- and post-menopausal women and amongst pre-menopausal women at different phases of the menstrual cycle[3].

Although researchers from myriad of disciplines are beginning to appreciate the importance of considering sex differences in the design and interpretation of their studies, this is an area that is full of potential pitfalls. A female's reproductive status and ovarian cycle have to be taken into account when studying sex differences in health and disease states.

To facilitate this consideration, the present study was designed to evaluate and carry out study of autonomic nervous system activity, comparing ANS activity in healthy male subjects with females during two phases of ovarian cycle.

MATERIALS AND METHOD

The present study was conducted on 200 medical students 100 males and 100 females in the age group of 17 – 25 years from Government Medical College and Indira Gandhi Govt. Dental College, Jammu. Selection of subjects was done on the basis of detailed medical history

and general physical examination. All those individuals with history of diabetes mellitus, neuropsychiatric disorder, smoking, alcohol consumption, females with irregular menstrual cycle, or history of any other illness known to affect autonomic nervous system were excluded from the study.

After detailing the purpose and methodology of the study, all eligible subjects were requested to participate. The study group comprised of all healthy males and females in the age group of 17-25 years. Subjects willing to participate were allocated into two groups:

1. Group 1 comprised of young healthy male volunteers.

2. Group II comprised of young healthy female volunteers.

Group II underwent two phases of examination:

First examination was done during late follicular phase between 10th to 13th day (Group IIA) and the second examination was done during mid luteal phase between 17th to 22nd day (Group IIB) of ovarian (menstrual) cycle.

Physical parameters noted in each subject were: Age (in years), Height (in cms), and Weight (in kgs). After recording their physical parameters, all the subjects underwent the following tests to assess Autonomic nervous system activity: For assessing sympathetic system activity, the parameters recorded were: 1. **Blood pressure**: Blood pressure of the subject was taken by auscultatory method with a Sphygmomanometer. Mean of the three readings of both SBP and DBP were taken as the actual SBP and DBP[4]**.**

2. **Blood pressure response to standing** (Orthostasis): The change in systolic and diastolic blood pressure in response to change in posture from supine to standing position was determined[5]. 3. **Cold pressor response**: Subject was asked to place his/her hand, up to the distal crease at the wrist, in cold water at a temperature of 4^0C for 2 min. Blood pressure from opposite arm was recorded at 30 sec. intervals for a period of two minutes. The maximum increase in systolic and diastolic BP while the hand was in the water was noted and its rise above basal levels was taken as the index of response[6].

For assessing parasympathetic functions, ECG was recorded by a simple compact electrocardiograph (CARDIART 108T). Various tests done include: 1.

Standing to lying ratio (S/ L ratio): Subject was asked to lie down after standing quietly for 2 minutes while a continuous electrocardiogram was made from 20 beats before to 60 beats after lying down and the S / L ratio was calculated as the ratio of the longest R-R interval during the 5 beats before lying down to the shortest R-R interval during the 10 beats after lying down[7]**. 2. 30: 15 ratio:** Subject was made to stand up after lying down position. Continuous electrocardiogram recording was made up to 50th beat, starting from the 1st beat just after standing. The 30:15 ratio was calculated as the ratio of the R-R interval at beat 30th to the R-R interval at beat 15th of the ECG recorded immediately upon standing[8]**.** 3. **Valsalva ratio**: Subject was asked to perform valsalva maneuver by blowing against a mercury column for 15 seconds and maintaining the pressure at 40 mm Hg. During the maneuver, the electrocardiogram was continuously recorded. The recording was continued for another 30 seconds after the strain. The valsalva ratio was calculated as the ratio between the longest R-R interval after the strain to the shortest R-R interval during the strain[9]**.** 4.**Tachycardia ratio**: This was calculated as the ratio of shortest R-R interval during valsalva effort and longest R-R interval before the effort[10]**.**

STATISTICAL ANALYSIS

The data was analyzed using computer software MS Excel and SPSS Statistics (Version 20) for Windows as mean and standard deviation and statistical difference in mean values was tested using unpaired Student's 't' Test.

RESULT AND DISCUSSION

Assessment of cardiovascular autonomic reflexes are critical element in evaluation of autonomic functions in human[11]**.** The arterial baroreflexes exert buffering influence on the magnitude of centrally induced variations of arterial pressure during day and night[12]**.**

Current interest centers on the development of new generation of tests for autonomic function that are simple, non-invasive and allow precision in diagnosis. Most are based on cardiovascular reflexes and abnormality in them is assumed to reflect autonomic damage. Probably no single test suffice and a battery of tests reflecting both parasympathetic and sympathetic function is preferable[13]**.**

To compare males and females, one must determine the age at which testing will occur, consider the environments in which they have developed, the time of day of the testing,

the appropriate method of measurement of the trait, etc. In short, knowledge of the individual's biology is important as well as knowledge of the environment and testing situations that would be optimal for testing sex differences are to be taken in account. In addition, there are occasionally dramatic effects of ovarian steroid hormones on sexually dimorphic traits and there are alterations in autonomic nervous system activity during the normal menstrual cycle. The observed changes in the cardiovascular parameters can be attributed to the established action of ovarian steroids predominating during different phases of menstrual cycle i.e. estrogen during follicular phase and progesterone during luteal phase. So it may not be sufficient to measure females at random throughout the reproductive cycle. In fact, many traits will differ as a function of day of the female's reproductive cycle. A better approach is to compare males with two or more groups of females where the stage of the ovarian cycle is known[3].

In the present study males were compared with females during late follicular phase and mid luteal phase of ovarian (menstrual) cycle. Group I and II did not differ in age, but differ significantly in height and weight. Age matched males had significantly higher height and weight as compared to females.

Blood Pressure:- Blood pressure differ significantly between males and females irrespective of the phases of menstrual cycle.

Table 1:Relationship of Mean Systolic & Diastolic Blood Pressure of Group I and Group II

Blood Pressure	GROUP I MEAN ± SD	GROUP IIA MEAN ± SD	GROUP IIB MEAN ± SD
SBP	122.14 ± 5.18	112.3 ± 5.18	115.8 ± 4.43
DBP	80.7 ± 3.97	71.54 ± 5.89	75.12 ± 5.45

Our findings are consistent with the other studies[14,15,16,17,18]. The impact of estrogen and progesterone has been emphasized on blood pressure regulation, and it has been found that sex differences in integrated systems (regulating blood pressure and body water) are primarily a function of the level of exposure to the ovarian hormones and sensitivity to this exposure[19].

Blood pressure response to standing (Orthostasis): - In the present study no significant difference was found between orthostatic fall in systolic BP in males and females

during late follicular phase however highly significant difference in males and females during late follicular phase, was found in diastolic rise in BP with females having less rise in DBP on standing than males. In mid luteal phase, the orthostatic fall in systolic blood pressure was highly significant between males and females whereas difference in the mean diastolic rise in BP on standing between males and females during this phase was statistically non significant ($p > .05$).

Table 2: Relationship of Mean Systolic and Diastolic Blood Pressure Response to Standing between Group I and Group II.

ORTHOSTASIS	GROUP I MEAN ± SD	GROUP IIA MEAN ± SD	GROUP IIB MEAN ± SD
SBP	-4.72 ± 3.26	-4.5 ± 3.56	-3.6 ± 2.54
DBP	3.1 ± 3.17	1.68 ± 1.81	2.38 ± 2.98

The findings of present study are in concert with the study of **Torsvik** et al.[16] who found decrease in mean systolic blood pressure with standing in all subjects (age > 20 yrs). Also, difference between men and women, with less of an increase in diastolic blood pressure upon standing in women was noted.

Cold Pressor Response:- The reactivity of blood pressure in cold pressor test is due to widespread vasopressor reaction initiated through a neurogenic reflex arc[20]. The difference in mean rise in systolic and diastolic blood pressure was statistically significant ($p< .05$) between males and Group 11A females. The difference between mean rise in systolic BP in males and Group 11B females was highly significant. Furthermore, the mean rise in diastolic blood pressure was higher in Group 11B females (5.62 ± 2.72 mmHg) compared to males (4.96 ± 2.96 mmHg) but was statistically non significant ($p > .05$).

Table 3: Relationship of Blood Pressure Response to Cold Pressor Test between Group I and Group II.

BP Response To CPT	GROUP I MEAN ± SD	GROUP IIA MEAN ± SD	GROUP IIB MEAN ± SD
SBP	9.32 ± 2.46	11 ± 3.99	16.72 ± 5.18
DBP	4.96 ± 2.96	3.16 ± 2.76	5.62 ± 2.72

Similar findings were observed in a study conducted by

Srivastava et al. The greater responsiveness to cold pressor test in young females could be attributed to increased pain sensitivity to cold, and/or genetic and hereditary factors overwhelming the hormonal protection offered by estrogen and nitric oxide (NO)[21].

Parasympathetic activity is assessed by measuring baroreflex control of heart rate during maneuvers which modify blood pressure. These tests measure a complex reflex arc reflecting a "beat to beat" balance of sympathetic and parasympathetic activity which can easily be altered by physical and emotional stress[22].

In the present study, statistically highly significant difference was found between Group I & Group IIA in terms of mean S/L ratio, mean 30:15 ratio and mean Valsalva Ratio on the other hand, the difference in mean Tachycardia Ratio between Group I and Group IIA was only significant, statistically.

There was a non significant difference in all four parasympathetic function tests between Group I and Group IIB.

Table 4: Comparison of various Parasympathetic Function Tests between Group I & Group II.

RATIO	GROUP I MEAN ± SD	GROUP IIA MEAN ± SD	GROUP IIB MEAN ± SD
S / L	1.23 ± 0.2	1.29 ± 0.08	1.21 ± 0.05
30 :15	1.08 ± 0.12	1.21± 0.09	1.16 ± 0.08
VR	1.26 ± 0.06	1.31 ± 0.08	1.27 ± 0.05
TR	0.76 ± 0.1	0.78 ± 0.07	0.76 ± 0.06

This demonstrates that females during late follicular phase have higher parasympathetic nervous system activity compared to males whereas the parasympathetic modulation of heart rate in similar in males and females during mid luteal phase. Similar results were noted in the various study [23,24,25,26].

CONCLUSION

It has been proved with the obtained results that significant gender related differences exist in the autonomic nervous system activity. As these differences vary with the phase of menstrual cycle in females, it is important to compare males with two or more groups of females where the stage of the menstrual (ovarian) cycle is known.

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Effect of Examination Stress on Cardiovascular Reactivity to Isometric Hand-grip Exercise in First Year Medical Students

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ABSTRACT

Background: Stress is known to alter physical and mental well being of exposed individual. The process by which stressful stimuli influence disease is multifactorial, interactive and individualistic.

Materials and method: In the present study 40 first year medical students (20 males and 20 females) were recruited. Their personality dimensions and stress level were assessed using EPQ-R and SRCL. Baseline heart rate, blood pressure and blood pressure response to Hand grip Dynamometer was taken as a parameter to assess cardiovascular reactivity.

Result: The study showed that overall stress score in female medical students was significantly raised (23.100±10.93) as compared to males (17.00±7.08) during first year professional examination. The pulse rate showed a significant rise from the control value of 82.3 to 87.3 beats/min. Similarly a significant rise in diastolic blood pressures from mean values of 75.6 mm Hg to 79.95 mm Hg was observed. In hand grip dynamometer test both male and female showed a borderline response during stress period. The delta change in Diastolic Blood pressure during examinations was statistically significant when compared to non stress period.

Conclusion: Medical students experience significant amount of stress during examinations. Female students experience more stress as compared to male students and their cardiovascular homeostasis is impaired with sympathetic predominance and vagal withdrawal.

Keywords: *Examination stress, heart rate, blood pressure, Handgrip Dynamometer, EPQ-R-Eyesnck's personality questionnaire, SRCL-Stress reaction check list.*

INTRODUCTION

Stress may be defined as psycho -physiological process usually experienced as a negative emotional state. It is a common condition, a response to a physical threat or psychological distress that generates a host of chemical and hormonal reactions in the body. The health effects of stress involve mainly autonomic, cardiovascular, and immune systems[1].

Medical education is perceived as being stressful. It is characterised by many psychological as well as physiological changes in students. Medical students encounter multiple anxieties in transformation from insecure students to young knowledgeable physician. High levels of stress may have a negative impact on mastery of academic curriculum [2]

Stress, health and emotional problems increase during the period of undergraduate medical education which can lead to mental distress and has a negative impact on cognitive functioning and learning[3]. Psychological stress is a risk factor for hypertension[4] and coronary artery disease[5].

Body elicits three stages of reaction when exposed to stress 1- Alarm stage, 2- Stage of Resistance and 3- Stage of Exhaustion. **Alarm stage** - a stressor disrupts homeostasis of a subject. Adrenal catecholamine secretion and other biological responses occur and individual

experiences heightened arousal, increased heart rate and the psychological urge to attack or flee from the stressor event**. Stage of Resistance**- The individual settles in to psychological mode of coping and possibly co-existing with the stressor, if the stressor cannot be eliminated**. Stage of Exhaustion**- a stressor persists despite attempts to either remove exposure to it, or to peacefully coexist with it. The individual basically "gives in" due to resource /energy depletion[6]

Effects of various grades of physical exercise on cardiovascular autonomic functions are well documented. Physical stress being simple to produce under controlled experimental conditions. The same however is not true of mental stress which is a non specific condition In laboratory models, mental stress leads to a rise in arterial pressure and heart rate, by way of altered neural cardiovascular regulation, typically consisting of increased sympathetic activity and reduced baroreflex gain, coupled to a prolonged endothelial dysfunction[4]

Academic stress, the stressful condition of students taking examination, can be considered as a good model of naturalistic stress in human beings as compared with laboratory-induced stress situations[7]. According to Herbert and Cohen's classification, it is an objective, discrete, short-term, and non-social stress[8]. Danner *et al* and Shukla *et al* in their studies on examination stress in medical students have demonstrated significant increase in the pulse rate and blood pressure during examinations as compared with baseline non-stressful states[9,10].

Evaluation of circulatory alterations during sustained isometric muscle contraction is a useful method to assess cardiac function[11]. The hemodynamic responses of this provocative test have been well-documented in adults. Characteristically, there is an increase in cardiac output and blood pressure, but little change in total peripheral resistance The raised systolic blood pressure is because of increased cardiac output and raised diastolic blood pressure is due to increased peripheral resistance during the exercise. All these circulatory changes result in an increased muscle blood flow to meet the demand of the muscles[12].

Hand grip strength is affected by many factors such as muscle size, age and gender of individual, prior physical activity patterns and psychological and behavioral factors.

In the present study, we measured personality dimensions and stress level of medical students. Baseline blood and heart rate was measured at two occasions. Blood pressure response to hand grip dynamometer was assessed for cardiovascular reactivity.

MATERIALS & METHOD

A total of 40 non-smoking, healthy 1st year medical students of either gender of the age group of 18 to 21 were taken in the study. Protocol was approved by institutional ethical committee. Care was taken while selecting students that none of these were suffering from any neuropsychiatric disorder known to affect the functioning of autonomic nervous system this was done with the help of Eyesenck's personality Questionnaire.

Students should not be having any chronic medical illness e.g. hypertension, tuberculosis and major psychiatric problem known to affect the autonomic nervous system. They should not be taking any drugs or beverages in quantity which affect the autonomic nervous system like anticholinergics. They should not be on long term drug therapy. Psychological stress related conditions like recent death of a family member, illness of family member, any family discordance and recent consultation for any psychiatric problem were ruled out. We measured personality dimensions and stress level of medical students. Baseline blood pressure and heart rate was measured. Blood pressure response to hand grip dynamometer was assessed for cardiovascular autonomic activity.

Students were divided in to two groups: Group A – 20 healthy male students, Group B – 20 healthy female students .All of them were non smoker and non alcoholic. They were instructed to have their meal at 8 pm the night before and avoid caffeinated drinks for 12 hours prior to the study. Detail of the experimental procedure was outlined to the participants and an informed written consent was obtained. The ethical committee of Santosh medical college, Gzb approved the study. Following test were performed twice i.e. at about two months after their admission to medical college (non stress period) then 15 days prior to first professional examination (stress period). The groups were then compared.

1. Eyesenck's personality questionnaire –exploring the dimensions of personality.

2. Stress reaction check list (SRCL) for appraisal of stress

3. Blood pressure response to hand grip dynamometer

Psychological tests were intended to find out one's proneness for psychological disturbance by pointing out pathological characteristics of personality like Psychoticism, Neuroticism, Extroversion/Introversion and also to find out coping abilities despite stressing life, where studies are important reason for stress generation.

Eyesenck's personality questionnaire-Revised –Dimensions typify the individual in a particular category of broad constellation of different traits. Personality assessment was done once on the sample of 40 randomly selected students when they had adjusted themselves in the medical college atmosphere.

Stress reaction check list

Stress reaction check list was developed specially for this study, comprised of 20 questions of the form – "I take longer time to complete things", "I have disturbed sleep", " I have bodily aches and pains" and respondents rated out their level on a four point scale.

Scale: 0.....Never,1.......Sometimes,2......Usually,3..... Always

A score of 0 to 20 was considered to present a mild stress, 20 to 40 was considered to present a moderate stress and 40 to 60 severe stress. This Stress reaction check list assessed the stress level of youngsters in the area of their nervous, physiological arousal, difficulties in concentration, feeling of frustration & indecisiveness' along with bodily functions like aches/pains, sleep appetite and problems of digestion.

Blood pressure response to Hand grip exercise

Test was conducted using 60 kg (Inco,Ambala) Hand grip dynamometer. Isometric exercise produces a significant increase in diastolic blood pressure and heart rate which can usually be elicited by using sustained handgrip .The response is reflex in nature and is due to increased peripheral resistance and increased cardiac output

Baseline blood pressure was recorded with standard mercury sphygmomanometer in all the subjects after ten minutes of rest. The participants were then asked to do maximum voluntary contraction using handgrip dynamometer by the dominant hand. Three attempts were made at interval of 1 minute and the highest reading was considered as the maximum voluntary contraction (MVC) for the participant. Then the subjects were asked to maintain a pressure of 30% of MVC for 5 minutes. During the grip blood pressure was recorded. The rise in the diastolic pressure just before releasing the grip was considered as an index of response to hand grip. In healthy subjects IHG increases DBP by 16 mm of Hg or more. Delta change in DBP was calculated from pre exercise (baseline) levels. Delta change in diastolic Blood pressure at both the occasions i.e.no stress and stress period were compared.

Statistical analysis was done using Students paired t-test with a p-value of <0.05 considered significant.

RESULTS

Table 1: The characterstic dimensions of personality of the medical students (n=40).

Dimensions of personality	Male(n=20)	Female (n=20)
Psychoticism	7.38	4.47
Neuroticism	11.15	15.00
Extroversion	13.38	11.5
Lie scale	10.76	10.28

Table 1 Shows that the scores for personality dimensions lie within the normal range indicating that the students are found to be free from any mental disturbance. Neither the students are introverted nor extroverted rather they are are enjoying the average expression of their problems. No false tendencies found.

Table 2: Perceived stress scores in female medical students as compared to males during Non stress period (no examination) and Stress period (Examination).

Stress level (mean±S.D)			p-value
Period of study	Male (n= 20)	Female (n=20)	
Non-stress period	16.00±8.22	19.00±6.095	>0.05
Stress period	17.00± 7.08	23.100± 10.93	<0.05

Table 2 shows that examination produced a significant increase in perceived stress scores in female medical students (23.10±10.93) as compared to males (17.00±7.08) .

Table 3: Comparison of Baseline blood pressure and heart rate of all students (n=40) at two occasions.

Parameter	Non-stress period (n=40)	Stress period (n=40)	p-value
Baseline HR(per min)	82.3±7.405	87.3±7.747	>0.05
Baseline BP(mm of Hg) Systolic BP	118.8±10.764	122.4±9.748	>0.05
Diastolic BP	75.6±9.427	79.95±6.618	<0.05*

Table 4: Comparison of change in SBP and DBP of all students (n=40) at two occasions during isometric hand grip exercise.

Parameter	Non-stress period (n=40)	Stress period (n=40)	p-value
Delta change in SBP (mm of Hg)	12.45±7.955	10.05±4.449	>0.05
Delta change in DBP (mm of Hg)	14.25±6.138	10.00±4.899	<0.05*

Table 3 show that baseline heart rate and blood pressure increase during the stress period(examination) but the change is not significant. There is a significant rise in diastolic blood pressure during exams. Table 4 shows that the delta rise in diastolic Blood pressure during non stress and stress period show significant change .

DISCUSSION

The main finding in this study on healthy subjects is a mild real life stressor, produced by preparation for a routine university examination is capable of significantly altering the hypothalamic-pituitary-adrenal (HPA) axis. This increases blood pressure and produces complex changes in cardiovascular regulatory mechanisms.

In the present study medical student's stress levels were checked twice and it was found to be significantly raised in the stress period (during first professional M.B.B.S. examination). It is in agreement with the findings of Resemberg PP et al which states that students find the academic demands of the medical training , during the first year as significant source of stress[13]

In our study it was found that female stress score was higher than males before (Females:19.00±6.095, Males: 16.00±8.22) and during exams (Females:23.100±10.93,

Males:17.00±7.08) Table-2. This is in accordance with the result of Kiecolt –Glaser et al. According to them female students respond to exam situation with stronger anxiety and more intense stress related psychosomatic reactions, also females are more responsibility oriented so they get stressed and anxious early[14]. We also observed that resting heart rate, systolic blood pressure as well as diastolic blood pressure of the students were higher in the stress period(during examinations) as shown in table-3. This is in agreement with the study of Stoney and Matthews which determined cardiovascular responses to physical and psychological stress[15]. Examination stress causes a decrease in parasympathetic influences on heart, this could be the reason for increase in heart rate. Malliani A et al reported that during examination, tachycardia and enhanced arterial pressure, together with a reduced baroreflex gain point to a major rearrangement of resting autonomic balance towards sympathetic predominance and vagal withdrawal suggesting a reset of major cardiac regulatory mechanism to a different resting level[16].

In the present study, results are in accordance with the result of Dimitriev AD et al who established that most students exhibit an increase in state anxiety, diastolic blood pressure and heart rate during examinations. The behavior of cardiovascular system of students under psycho

emotional stress varied considerably depending on how they were prepared for examination and on the subjective prediction of success[17]. Freychuss et al attributed the increase in pulse rate and blood pressure to increased epinephrine secretion. The rise in pulse rate and mean blood pressure are important sympatho-adrenal responses to physiological stressful experience. When the outcome viz examination result is unpredictable, or in conditions of fear there is increase in adrenaline secretion and thus alertness[18]. Increased level of plasma epinephrine and nor epinephrine during stress by their action on beta receptors of heart, increases heart rate[19] and systolic blood pressure[3]

Our results are also consistent with the study done by Bhimani NT et al who determined cardiovascular reactivity using isometric hand grip exercise and found that change in diastolic B.P.as compared to baseline values was less during stress period as compared to non stress period[20]. In our study, delta change in Diastolic B.P was 14.25 ± 6.138 in non stress period and 10.00 ± 4.899 in stress period (Table 3) which is statistically significant suggesting a impairment in autonomic responses.

LIMITATION OF THE STUDY

In this study we did not measure biochemical parameters to establish stress like the plasma or salivary Cortisol level. We only used a self report questionnaire to assess the intensity and psychosomatic reactions to examination stress.

CONCLUSION

It is established that female medical students are more stressed as compared to males during exams. The students' cardiovascular homeostasis is altered with sympathetic predominance and vagal withdrawal. It is suggested that any research has significance if it has a treatable value. Thus it becomes important for medical educators to know the prevalence and causes of students' distress, which not only affects the health, but also their academic achievements. Yoga sessions should be held time to time and stress management courses should be organized by medical colleges to improve mental as well as physical health of students.

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A Study of Autonomic Function Tests Between Obese and Non-Obese Adolescents

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ABSTRACT

Introduction: Childhood obesity affects around 16% of the world population aged 6 to 19 years. In addition to being highly prevalent, obesity in adolescents is responsible for the emergence and development of cardiovascular diseases.

Objective: to assess the difference in autonomic function between the obese and nonobese adolescents.

Method: sixty adolescent male subjects aged between 17 and 19 years were selected for this study. With reference on their body mass index, these subjects were divided into a nonobese group (n =45) and obese group (n = 25). Autonomic function tests for analyzing parasympathetic function (such as heart rate response to immediate standing and standing to lying ratio) and sympathetic function (such as blood pressure response to immediate standing and cold pressor test) were performed.

Results: Statistical difference in sympathetic and parasympathetic function between the obese and nonobese adolescents was not observed .

Conclusion : This study indicate that there was no difference in autonomic function between the obese and nonobese adolescents, which could be due to the level of obesity and physical activity of these subjects.

Keywords: *Adolescence, autonomic dysfunction, obesity.*

INTRODUCTION

Adolescence is considered to be one of the critical periods for the development of obesity[1]. Obesity arises due to the interaction between various genetic and environmental factors[2-4]. The last two decades of the previous century have witnessed a dramatic increase in healthcare costs due to obesity and related issues among children and adolescents[4]. Globally, an estimated 10% of school children between 5 and 17 years of age are overweight or obese in India[5]. According to an estimate by the World Health Organization, there will be about

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2.3 billion overweight and over 700 million obese people of age 15 and above by 2015 [6]. A study from South India reported a prevalence of 3.6% in the age group of 13–18 years in Chennai in 2002 [7], 3.4% in age group of 5–16 years in Mysore in 2009 [8], and 3.6–7% in North India [9-12].

Autonomic nervous system is involved in energy metabolism and regulation of cardiovascular system[6], therefore it is considered that one or more subgroups of obesity have an alteration in their autonomic nervous system that may promote obesity and account for clinical consequences of obesity. In adult obese, both the divisions of autonomic nervous system are affected which may further cause various cardiovascular complications[11].

Obesity is becoming a global epidemic in both children and adults and is associated with co-morbidities such as cardiovascular diseases, diabetes, hypertension, cancer, and sleep apnea. Therefore, emphasis should be laid on early

detection of the autonomic dysfunction in obese adolescent population. Though few have studied the altered autonomic function in obese adolescents, the results were conflicting. Hence, in this study, an assessment and comparison of autonomic dysfunction in obese and nonobese adolescents were performed.

METHOD

Sixty adolescent male subjects aged between 17 and 19 years during April 2015- August 2015 were selected for this study .   An ethical approval from the Ethical Committee of Fathima Institute of Medical Sciences, Kadapa was obtained .

A sample of 60 subjects were grouped into obese group (body mass index [BMI] >30 kg/m 2) and nonobese group (BMI – 18.5–29.9 kg/m 2). Athletes, smokers, alcoholics, subjects with any known medical condition in past 6 weeks and subjects on any medication were not included in the study. Informed consent was taken from the recruited subjects after explaining in detail about the procedure.

The four autonomic function tests employed were:

1.   Heart rate response to immediate standing (30: 15):

After a rest of 15 min in the supine position, the electrocardiogram (ECG) leads were positioned, and ECG recording was started. The patient was asked to stand from the supine position without displacing the leads. 30:15 ratio was calculated by taking the ratio of longest R-R interval around beat 30, and shortest R-R interval around beat 15 after standing.

2.   Standing to lying ratio (S/L ratio):

In standing position, ECG was recorded for 20 beats, and then the patient was asked to lie down with the leads attached as quickly as possible. The ECG recording continued for 60 more beats in the lying position. The point at which subject started to lie down was marked. S/L ratio was calculated as the longest R-R interval during 5 beats before lying down to shortest R-R interval 10 beats after lying down.

3.   Blood pressure response to standing:

Blood pressure was recorded in the supine position, and the subject was then asked to stand immediately motionless and blood pressure recording was noted after 30

s interval for 2 min. The difference between the readings of systolic blood pressure and diastolic blood pressure in lying and immediate standing were calculated.

4.   Cold pressor test:

The subject was comfortably seated in a chair, and the resting blood pressure was recorded. These subjects were then asked to immerse his/her other hand in cold water maintained at 4–6°C till the wrist joint. Blood pressure measurement was taken from other arm at pain threshold time.

Data analysis was done using SPSS version 17 (IBM Developers). Independent Student's *t*-test was used to determine the differences in autonomic function responses in obese adolescent and nonobese adolescent. P < 0.05 was considered statistically significant.

RESULTS

The mean age of the subjects was 18.27 ± 0.302 in the nonobese adolescent group and 18.16 ± 0.505 in the obese adolescent group. Even though the mean values of parameters including Systolic Blood Pressure Response To Standing (obese subjects:7.04±6.39 and non obese subjects : 6.97±5.34) , Diastolic Blood Pressure Response To Standing (obese subjects : 6.93±5.35 and non obese subjects : 6.02±5.78), Cold Presser Test-Diastolic (obese subjects : 4.38±9.34 and non obese subjects : 6.05±10.01), Cold Presser Test- Systolic (obese subjects : 3.67±8.29 and non obese subjects : 1.02±7.31) and   Standing To Lying Ratio (obese subjects : 1.01±0.38 and non obese subjects: 1.20±0.23)   showed a variation between both groups. However it was not statistically significant (table 1).

DISCUSSION

There was no statistically significant difference in sympathetic function tests between the obese and nonobese adolescents. Rossi et al.[13] and Tonhajzerova et al.[14] have also reported no significant difference in the sympathetic function tests between obese and nonobese subjects, which are in line with the findings of the present study suggesting a less frequent involvement of sympathetic function.

The parasympathetic function tests such as heart rate response to immediate standing ($P = 0.358$) and S/L ratio ($P = 0.08$) were also found to be not significant between obese and nonobese adolescents. Both parasympathetic and sympathetic divisions have been found to be affected

in the adult obese population as compared to the nonobese adult population [2]. In adolescent population, Vanderlei *et al.*[15] reported a reduction in both parasympathetic and sympathetic function in the obese adolescent group as compared to the nonobese adolescent group and whereas another study by Taşçilar *et al.* on cardiac autonomic function in obese adolescents reported a parasympathetic withdrawal and sympathetic predominance [16].

Autonomic nervous system has been reported to be affected by the duration of obesity, level of obesity as well as the physical activity levels. It has also been reported that physically active children both obese and nonobese children have a greater autonomic nervous system activity compared to the inactive children [17]. It has also been reported that cardiac autonomic functions get affected in extremely obese children, and there was no difference in the cardiac autonomic function between the normal weight and overweight children [18]. Rabbia *et al.* reported that children with a shorter history of obesity had no marked sympathovagal imbalance, characterized by reduced tonic cardiac vagal outflow and an increase in the sympathetic

hyperactivity whereas children who were obese for a longer duration had reduced sympathovagal imbalance [19]. In adolescence with longer duration of obesity, the cardiac autonomic functions tend to normalize suggesting regionalization of the sympathetic activation in the kidney and vasculature with a resetting of baroreflex control of the cardiovascular system or involvement of other nonautonomic factors to maintain arterial hypertension.

In present study, the mean BMI for the obese group was 33.27 which might have not resulted in a statistically significant difference between the obese and the nonobese adolescent group. As the level of physical activity also plays an important role in the regulation of autonomic function response, the subjects in the present study mainly comprised college going students who were not sedentary. Therefore from the findings of the present study, we might suggest that the level of obesity and physical activity plays an important role in the autonomic nervous system function [18]. Confounding factors such as duration of obesity, the level of physical activity, and family history were not taken into consideration in the present study.

Table 1: Showing the autonomic functions tests of obese and non obese adolescents

Parameters	Group 1 (N=25) Obese Individuals Mean ±SD	Group 1 (N=35) Non-Obese Individuals Mean ±SD	P -Value
Systolic Blood Pressure Response To Standing	7.04±6.39	6.97±5.34	0.888
Diastolic Blood Pressure Response To Standing	6.93±5.35	6.02±5.78	0.354
Cold Presser Test – Diastolic	4.38±9.34	6.05±10.01	0.566
Cold Presser Test- Systolic	3.67±8.29	1.02±7.37	0.832
30:15 (R1)	1.39±0.86	1.05±1.93	0.358
Standing To Lying Ratio (R2)	1.01±0.38	1.20±0.23	0.083

CONCLUSION

The results of the present study indicate that there was no difference in autonomic function between the obese and nonobese adolescents, which could be due to the level of obesity and physical activity in these subjects. Therefore, future studies should be conducted in a larger sample size

considering the other confounding factors. However as earlier studies have reported higher risks associated with adulthood obesity, appropriate interventions should be planned at the earlier ages.

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Correlation of BMI to HRV in Young Healthy Male Subjects

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ABSTRACT

Introduction: obesity is one of the rising problem in present world and one of the parameter which reflects this is body mass index. The effect of autonomic nervous system on heart and its relation to body mass is an attempt to look in the problem with new solutions in it. The study was designed to find correlation of BMI to HRV in young healthy subjects.

Materials & Method : 50 each male and female subjects in age group of 18-25 were randomly recruited in medical college. BMI of subjects was calculated using formula body weight divided by the square of the height (kg/m^2), was used as a marker of obesity. BMI < 25 kg/m^2non-obese, 25-30 kg/m^2 as overweight and >30 kg/m^2as obese. In the supine position systolic blood pressure, diastolic blood pressure and pulse rate were recorded and continuous standard lead II ECG was recorded for five minutes in eyes closed relaxed state. The data was later computed and analyzed automatically using the software ECG V; 52.Comparisons between groups were performed using analysis of variance. Nonparametric variables are presented as number and percentage, and associations between analyzed parameters were examined using Spearman's correlation coefficient

Results: A statistically significant correlation of BMI, heart rate and systolic blood pressure among the groups was observed but diastolic blood pressure was not significant. The mean value of time domain as well as frequency domain measures of heart rate variability decreases as BMI increases but statistical significance could not be established when compared between the groups. In frequency domain parameters BMI is negatively correlated to all parameters except to LF/HF ratio where we noticed positive correlation between BMI and time domain variables.

Conclusion: In conclusion our study suggests that increased body weight is associated with decreased heart rate variability and body mass index has a significant correlation with heart rate variability. Autonomic nervous system help in identifying subjects at risk of cardiovascular disease and precautions are taken early in life like dietary or physical training to keep body weight in control would help in maintaining a balanced output by autonomic nervous system.

Keywords: Heart rate variability, body mass index, Autonomic nervous system.

INTRODUCTION

Heart rate variability (HRV) is a physiological phenomenon resulting from the influence of autonomic nervous system innervation to heart. Various studies during last two decades have identified decreased HRV as a major factor related to cardiovascular mortality[1].Obesity is one of the individual cardiovascular risk factor and along with clusters to produce various other factors which promote cardiovascular mortality. The prognosis of any metabolic disorder associated with obesity is fatal. Recent studies are suggesting obesity as one of the primary etiology for the development of altered autonomic nervous system[2, 3].

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The measurement of Heart Rate Variability (HRV) provides a noninvasive tool for assessing autonomic heart rate control. HRV is a term used to describe the variation in time-intervals between heart beats, i.e. variations in electrocardiographic R-to-R peak interval lengths. HRV is primarily due to the changing modulation of vagal and sympathetic control of the heart and may therefore be considered as an estimate of autonomic HR control. From the clinical point of view, the measurement of HRV has received a great deal of attention because abnormalities in HRV after myocardial infarction are strongly associated with an increased risk for death[4,5]

Heart rate is regulated by a complex set of interactions between vagal and sympathetic control. The effects of the two autonomic divisions on the heart can vary reciprocally. Because the two autonomic divisions exert opposing control over the heart, a given increase in heart rate may arise from distinct autonomic origins, such as vagal withdrawal, sympathetic activation, or both. Therefore, cardiac chronotropic response per se does not provide specific information on either the vagal or sympathetic control of the heart. Furthermore, the predominance of vagal heart rate control over sympathetic heart rate control, termed accentuated antagonism, has been documented[6].

This means that the opposing effects of vagal and sympathetic control are not algebraically additive. Instead, the effects of vagal control on heart rate are augmented with high levels of sympathetic background control and the effects of sympathetic control on HR are suppressed with levels of vagal background control[6].

HRV increases in magnitude during early childhood and begins to decrease after the first decade of life. During adult life, normal aging is associated with a decrease in all the time domain HRV indices and a decrease in HRV spectral power on each frequency band. These changes are related to a decline in the functioning of the autonomic nervous system in general as well as to the deterioration of the cardiovascular system including both structural and functional changes in the heart and in blood vessels. Gender differences have been observed to decrease with age and they may disappear at advanced age[7, 8].

The aim of the study was to evaluate the impact of body mass index on cardiac autonomic nervous activity in young adults.

MATERIALS AND METHOD

50 each male and female subjects in age group of 18-25 were randomly recruited in medical college. All subjects completed a questionnaire about medical history, tobacco use and daily physical activity. The subjects with chronic systemic illness were excluded from study. The subjects having habits of tobacco and alcohol consumption were also excluded. All the participants were informed about the objectives of the study and obtained informed consent. The study was approved by the Research Ethics Committee of the institution.

Body weight and height was measured without shoes and minimum clothing to the nearest 0.1kg and 0.5cm respectively. Body mass index (BMI), calculated as the body weight divided by the square of the height (kg/m^2), was used as a marker of obesity. BMI < 25 kg/m^2 non-obese, 25-30 kg/m^2 as overweight and >30 kg/m^2 as obese.

Subjects were made to relax in supine position for 15min before the start of procedure

In the supine position systolic blood pressure, diastolic blood pressure and pulse rate were recorded and continuous standard lead II ECG was recorded for five minutes in eyes closed relaxed state. The data was later computed and analyzed automatically using the software ECG V; 52 to obtain the cardiac autonomic activity tone under standard conditions.

Frequency domain variables: Low Frequency (LF) (0.04–0.15 Hz) range reflects the mixture of sympathetic and parasympathetic activation. High Frequency range (HF) (0.15–0.40 Hz) measures vagal control. LF/HF indicates symphatho-vagal balance. Time domain analysis was calculated using RR series a rate-detector algorithm after exclusion of artifacts and ectopic. Standard deviation of normal-to-normal RR intervals (SDNN) was taken as an index of overall HRV. The RR series was resampled at 4 Hz, the mean and trend removed, a Hann window applied and the 1024 data point series transformed by fast Fourier transformation. Another class of time-domain indices consists of indices derived from the differences between RR interval (RRIs). These indices include the square root of the mean of the sum of the squares of the differences between adjacent RRIs (RMSSD) and the percentage of the adjacent RRI differences > 50 ms (pNN50). RMSSD and pNN50 are highly correlated and both indices mainly reflect respiratory-related fluctuations in RRI.

Continuous data are expressed as mean ± standard derivation. Comparisons between groups were performed using analysis of variance. Nonparametric variables are presented as number and percentage, and associations between analyzed parameters were examined using Spearman's correlation coefficient. A p value of < 0.05 was considered statistically significant.

RESULTS

The baseline characteristics of study group is mentioned in Table No.1 where the group of subjects are mainly classified into 3 groups based on BMI and mean value of age, BMI, heart rate and blood pressure values are depicted in mean values. On analysis by ANOVA mean age group between the groups were not significant whereas BMI, heart rate and systolic blood pressure among the group was statistically significant but diastolic blood pressure was not significant.

Table No.1: Baseline Characteristics of the subjects

Characteristics	(n=50)				
BMI (Kg/m^2)	<25 (n=22)	25-30 (n=16)	>30 (n=12)	F value	P value
Age (years)	19.12±1.33	19.18±1.35	20.62±3.62	2023	0.118(NS)
BMI (Kg/m^2)	21.16±2.7	27.65±3.17	32.34±3.24	58.3	0.001(S)
HR(bpm)	72.38±3.66	73.62±3.62	79.64±8.84	7.53	0.001(S)
SBP (mmHg)	112.72±5.54	115.2±5.51	124.62±9.45	12.77	0.001(S)
DBP (mmHg)	78.24±6.58	79.12±5.64	83.91±8.6	2.81	0.07(NS)

NS-Not significant   S-Significant

The heart rate variability parameters as expressed in Table No.2 highlights the mean value of time domain as well as frequency domain measures of heart rate variability decreases as BMI increases but statistical significance could not be established when compared between the groups about this change except frequency domain measure of Total Power which indicates both the limbs of sympathetic and parasympathetic contribution present in it.

Table No.2: Parameters of Heart Rate Variability in different groups of BMI

Parameter	(n=50)				
BMI (Kg/m^2)	<25 (n=22)	25-30 (n=16)	>30 (n=12)	F value	P value
SDNN	131.8±35.87	128.24±28.61	115.9±24.28	1.031	0.36(NS)
RMSSD	41.35±15.68	37.62±16.27	32.55±10.2	1.384	0.26(NS)
NN50	7.4±4.2	7.1±3.9	6.7±4.6	0.108	0.897(NS)
PNN50	6.58±1.53	6.2±2.35	5.36±2.39	1.39	0.257(NS)
TP	3733.5±258.25	3547±196.41	3001±269.8	35.69	0.001(S)
LF(nu)	209.46±61.3	218.32±84.25	184.72±57.32	0.851	0.433(NS)
HF(nu)	65.1±6.1	63.22±7.24	59.39±5.68	3.17	0.051(NS)
LF/HF	3.21±0.5	3.45±1.2	3.11±0.9	0.593	0.557(NS)

NS-Not significant   S-Significant

Table No.3: Correlation between BMI and heart rate variability parameters

BMI (Kg/m^2)	SDNN	RMSSD	NN50	PNN50	TP	LF(nu)	HF(nu)	LF/HF
<25 (n=22)	-0.5**	-0.6**	0.3	0.3	-0.5**	-0.5**	-0.6**	0.6**
25-30 (n=16)	-0.5**	-0.4*	0.3	0.3	-0.6**	-0.5**	-0.5**	0.6**
>30 (n=12)	-0.5*	-0.3	0.2	0.2	-0.5*	-0.5*	-0.5*	0.5*

P value <0.05*   P value <0.01**

As shown in Table no.3 correlation between BMI and HRV parameters frequency domain parameters were negatively correlated with BMI which is reflected in SDNN & RMSSD values. The values of NN50 and PNN50 were not significant. In frequency domain parameters BMI is negatively correlated to all parameters except to LF/HF ratio where we noticed positive correlation between BMI and time domain variables.

DISCUSSION

Age, gender, heart rate, and blood pressure affect HRV in a significant manner hence the present study was primarily designed to focus on body mass index and its effect on HRV parameters. The association between decreased heart rate variability and increased risk of cardiac morbidity has been established by various studies which suggest decreased HRV as one of the main reason for death in such patients[1, 9]. A study conducted by Arrone L. et al[10] demonstrated that a10% body weight gain reduces parasympathetic activity in non-obese while 10% weight loss increased parasympathetic and decreased sympathetic nervous system activity in both obese and non-obese. Lansberg et a[11] hypothesized that increase in sympathetic nervous system activity with increased weight serves homeostatic role of increased thermogenesis which further prevents weight gain by increasing energy expenditure.Also, adiet induced increase in plasma insulin concentration was primary mechanism mediating weight gain induced sympathetic neural activation[12].   Increased body weight with cardiac abnormalities has a significant impact on autonomic nervous system and is one of the mechanisms which explain deleterious effect on systemic functioning[13]

Our results showed that heart rate variability in obese individuals is different from non-obese individuals even though we found decreased heart rate variables the difference in the variables was not statistical significant in comparison we have several authors who have found an association between obesity and weight loss affecting heart rate variability[14, 15,] in contrast to this we also have studies suggesting no significant association between BMI and heart rate variability[16, 17] .

Our study results suggested significant correlations between hear rate variability parameters and body mass index at rest. The significant negative correlation between increased body weight and low frequency (nu) variable indicates association of sympathetic system alteration and one of the major cause of abnormality in obesity, similarly involvement of RMSSD time domain measures suggest that parasympathetic component also involved in relation with obesity that autonomic nervous system at large is affected because of increased body weight and effects to pathological conditions later in life.

Studies related to cardiac function mainly by autonomic nervous system in obese individuals is always controversial where the decreased heart rate variability is explained either due to increased sympathetic activity or decreased parasympathetic activity which is mainly attributed due to different methodologies adopted by different authors always comparing the studies done with short term recording to continuous ambulatory recorded parameters. Mainly because in condition of short term of recording the values obtained may not be the actual surrogates of ongoing process in body reflecting the state of autonomic nervous system.

CONCLUSION

In conclusion our study suggests that increased body weight is associated with decreased heart rate variability and body mass index has a significant correlation with heart rate variability. Autonomic nervous system help in identifying subjects at risk of cardiovascular disease and precautions are taken early in life like dietary or physical training to keep body weight in control would help in maintaining a balanced output by autonomic nervous system and preventing sudden cardiac deaths later.

LIST OF ABBREVATIONS

ANSAutonomic nervous system

BMI Body mass index

BP Blood pressure

HF High Frequency Power in high frequency bands (0.15-0.4 Hz)

HFnu High frequency in normalized units HR

Heart rate HRV Heart rate variability

LF Low frequency power in low frequency bands (0.04-0.15 Hz)

LFnu Low frequency in normalized units

NN50 Normal to normal intervals for 50ms

pNN50 Relation of NN differences

RMSSD Square root of means of squared differences of consecutive NN intervals

SBP Systolic blood pressure

SDNN Standard deviation of all NN intervals

TP Total Power

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