

## Lipid Profile, Glycaemic and Anthropometric Status of Students of a Private Medical College in Dhaka City

\*R Yeasmin<sup>1</sup>, S Parveen<sup>2</sup>, N Nahar<sup>1</sup>, K Begum<sup>1</sup>, F Akhter<sup>3</sup>, M Aziz<sup>3</sup>, F Islam<sup>3</sup>, T Eyaub<sup>3</sup>

<sup>1</sup>*Dr. Rokhsana Yeasmin, Dr. Nazmun Nahar & Dr. Khadiza Begum  
Associate professor of Biochemistry, Ibrahim Medical College*

<sup>2</sup>*Prof Dr. Sultana Parveen, Professor and Head of the department of Biochemistry, Ibrahim Medical College*

<sup>3</sup>*Dr. Farzana Akhter, Dr. Murshida Aziz, Dr. Fahmida Islam, Dr. Tohfa Eyaub, Lecturer of  
Biochemistry, Ibrahim Medical College*

\*Corresponding author

### ABSTRACT

Over weight and obesity are recognized as recent threat which affecting both developing and developed countries. Obesity and its associated morbidities are leading cause of most non-communicable diseases. Few recent studies have indicated the presence of increasing in over weight and obesity among children and adolescent but there is no study among adult groups. This cross sectional study was done to assess the prevalence of overweight, obesity and metabolic variables with their relation among medical students. Our result reveals that 8.6% & 1.9% male and 15% & 3.2% female are suffering from overweight and obesity (based on BMI) respectively. More females (31.3% and 65.2%) are centrally obese than males (3.5% and 34.8%) (According to Waist Hip ratio and Waist Height ratio respectively). But according to Waist circumference more males (30.7%) are obese than females (24%). There is also significant difference of male and female BP. DBP & SBP of male (79.22mmHg & 118.9 mmHg) have high normal level than female (72.71mmHg & 108.67mmHg) ( $P < 0.001$ ). There is no significant difference of glycaemic status and lipid profile with central obesity. Although male students have high upper level of blood pressure, female students are more obese than males (both according to BMI and central obesity). High blood pressure and obesity both acts as risk factors for the development of non communicable disease. Student's awareness therefore should be increased to reduce central obesity & BP within normal range.

**Key Words:** B.M.I-body mass index, WC-waist circumference, WHR-Waist Hip ratio, WHtR-Waist Height ratio, central obesity, medical students

### Introduction

Overweight and obesity are considered major epidemic health problems in both developed and underdeveloped countries as many studies showed a remarkable rise<sup>1</sup>. Several recent studies in the United States, showed that overweight and obesity prevalence is increasing dramatically and suggesting that 86.3% of adults will be overweight or obese as well as 51.1% will be obese by 2030<sup>2</sup>.

Overweight and obesity are recognized as an 'escalating epidemic' affecting both developed and developing countries. Obesity and its associated morbidities are leading causes of cardiovascular disease (CVD), type-2 diabetes and several other health problems<sup>3</sup>. Physical activities promote controlling blood lipid abnormalities, diabetes, and obesity. On the other hand, sedentary lifestyle is associated with

high risk of coronary, cerebral, and peripheral vascular diseases and all- cause morbidity and mortality among both gender at all ages<sup>4</sup>.

It is estimated that more than 2 million deaths annually in the world are attributed to physical inactivity<sup>5</sup>. Cardiovascular(CV) diseases are the leading cause of mortality and morbidity in the world even in the developing countries<sup>6</sup>.

Evidence indicates that the pathophysiological process of cardiovascular (CV) disease begins at early age, though the manifestations of the disease do not appear until middle age adulthood. Risk factors for CV disease, particularly lipoprotein profiles, are affected by physiological abnormalities, and lifestyle related issues<sup>7</sup>.

The childhood roots of adult obesity and also dyslipidaemia, glycaemic status are widely recognized and associated which calls for health promotion targeted at youth. Recent studies have indicated the presence of increasing trends in overweight and obesity among children and adolescents in Greece, but there is no study among adult groups. Moreover, although there are many studies on the health status of medical students, a target group of particular interest as they are future physicians, these have mostly tracked the use of alcohol and tobacco<sup>8</sup>.

Although obesity has important genetic and familial components, environmental factors are probably the predominant factors in the current epidemic. In addition to the approach provided by Guo et al the status of the parents can be used. Children from families in which one or both parents are overweight have a substantially higher risk of becoming obese than do children whose parents are not overweight<sup>5</sup>.

Obesity relates to other risk factor in children as well as adults, but there is little information on the effects of persistent obesity in early life. Because obesity begins in childhood, it is important to determine the level at which obesity begins to influence cardiovascular risk. Consequently, individuals who have been obese since childhood are of particular interest for studying the early natural history of obesity and its relationship to the development of dyslipidaemia and glycaemic status. Childhood

obesity is associated with high level blood pressure, LDL Cholesterol, insulin resistance and lower level of HDL-C, increased heart rate and increased cardiac output<sup>4</sup>.

The aim of this descriptive study was to assess the prevalence of overweight, obesity and high blood pressure and dyslipidaemia, among medical students. Anthropometric indices include body mass index (BMI), waist circumference and waist to hip ratio (WHR) and waist height ratio (WHtR). These data are not always easy to interpret but they are important to obtain because, overweight adults are at increased risk for adverse health outcomes, including mortality in later life. Prospective and retrospective studies have shown that obesity, Lipid Profiles, unhealthy diets and sedentary life style have their roots in childhood and tend to track into adulthood<sup>5</sup>.

### Methods and Materials

This Cross sectional study was carryout in Ibrahim medical college from June 2012-June 2013 among medical student of Ibrahim Medical College from 1st year to 5<sup>th</sup> year. 313 students were selected on the basis of their availability for examine in due time. Our aim was to assess the prevalence of overweight, obesity and metabolic variables with their relation among medical students. Data was taken on a questionnaire and check list. Participants after obtaining informed consent will be examined on following parameter: Anthropometric measurements such as, BMI, WC, WHR and WHtR (to define normal overweight and obesity), Blood pressure, Lipid profile, Glycemic status.

### Methods for Anthropometry and Blood Pressure

Anthropometric measurements was done by a digital scale to measure body weight (BW). Body height (BH) was measured by using a commercial stadiometer. Body Mass Index (BMI) was calculated as BW in kg divided by the square of the BH in meters (m<sup>2</sup>). Waist circumference (WC) was measured in the highest point of iliac crest at the level of umbilicus and hip circumference (HC) at the fullest point around the buttocks. Hip and waist ratio and waist to height ratio will be measured also<sup>9</sup>.

Based on the INTERNATIONAL OBESITY TASK FORCE, convened by the world health organization, a subject with BMI of 25-29.9 kg/m<sup>2</sup> was defined as overweight; BMI  $\geq$  30 kg/m<sup>2</sup> was defined as obese. The waist circumference (WC), waist to hip ratio (WHR) and waist height ratio (WHtR) measurements was used to determine the extent of central adiposity. For waist circumference, cut off points of  $\geq$ 90 cm in men and  $\geq$ 80 cm in women will be used<sup>11</sup>. A waist to hip ratio  $\geq$ 0.9 in men and  $\geq$ 0.8 in women was considered to represent central obesity<sup>12</sup> and waist to height ratio values of  $\geq$ 50 in either sex was adopted as cut offs 10. The individual blood pressure was measured by sphygmomanometer at sitting position. Optimal systolic blood pressure is <120mm of Hg, normal SBP is <130 mm of Hg and high normal SBP is 130-139mm of Hg<sup>16</sup>. Optimal diastolic blood pressure is <80mm of Hg, normal DBP is 85 mm of Hg and high normal DBP is 85-89 mm of Hg<sup>16</sup>.

### Collection of blood samples

Early morning, venous blood samples was drawn for biochemical screening tests, following a 12- hour overnight fasting. Blood samples was collected from the study subjects with all aseptic precautions in clean and dry test tube. Under all aseptic precautions 5cc of blood was collected from the study subjects by using disposable syringe from the medial cubital vein. The needle was detached from the nozzle and blood will be transferred immediately into a dry clean plastic test tube with a gentle push to avoid haemolysis. Collected blood will be allowed to clot and centrifuged. Separated serum then collected into plastic micro centrifuged tubes and appropriately labeled and stored at -20<sup>0</sup>C.

### Laboratory method

Serum glucose was measured by glucose - oxidase- peroxidase method.F.B.S(fasting blood sugar) 3.5-5.6mmol/l and 2ABF(2hours after breakfast) is 7.8-11.1mmol/l<sup>13</sup>. Lipid profile (serum Total Cholesterol, serum tri-glyceride, LDL-C and HDL-C) was measured. Serum total cholesterol was measured by cholesterol oxidase-peroxidase method<sup>14</sup>. Serum tri-glyceride(TG) and serum HDL-C was measured by kit method. Serum LDL-C was calculated by a formula<sup>6</sup>.

The formula is as follows:

$$\text{LDL-cholesterol} = \text{Total Cholesterol} - (\text{HDL-cholesterol} + \text{TG}/5)^6.$$

Dyslipidaemia is defined as total cholesterol  $\geq$  5.2 mmol/L (200 mg/dl), TG  $\geq$  1.5 mmol/L (150 mg/dl), LDL-C  $\geq$ 3.4 mmol/L (130 mg/dl) and HDL-C  $\leq$ 0.9 mmol/L (40 mg/dl). These cut offs correspond to the adult panel treatment-III criteria for borderline high total cholesterol, TG, LDL-C and low HDL-C levels (ref). a total cholesterol : HDL-C  $\geq$  4 will also considered as adverse serum lipid profile<sup>5</sup>.

**Statistical analysis:** All collected data are corrected and entered into the computer based SPS program for analysis. Qualitative data will be analyzed by Chi-Square test and quantitative data by students T-test

### Result

**Table-I:** General characteristics of study subjects. (n=313)

Characteristics	Minimum	Maximum	Mean ( $\pm$ SD)
Age (year)	17	25	20 (1.47)
<b>Blood Pressure (mm of Hg)</b>			
Diastolic	60	100	75 (8.5)
Systolic	80	140	112.5 (11.5)
<b>Lipid Profile (mg%)</b>			
Total cholesterol	83	297	156 (30.7)
Triglyceride	82	356	159 (46)
High density lipoprotein	15	74	40 (11)
Low density lipoprotein	23.5	238	85.7 (29.7)
<b>Blood Glucose(mmol/L)</b>			
Fasting blood glucose	2.6	10.2	4.3 (0.9)
Blood glucose 2hr after breakfast	2.8	12.2	5.4 (1.0)
<b>Anthropometry</b>			
Height (cm)	126	190	160.75 (9.15)
Weight (kg)	32	100	60.26 (12.62)
BMI (Kg/m ) <sup>2</sup>	12.7	37.0	23.2 (4.0)
Waist circumference (cm)	33.0	113.0	78.7 (12.4)
Waist Hip Ratio	0.09	1.2	0.83 (0.09)
Waist Height Ratio	0.20	0.72	0.49 (0.08)

**Table-II:** Anthropometric and metabolic variables of the participants according to gender

Variable	Total Mean $\pm$ SD	Gender		P value
		Male Mean + SD	Female Mean + SD	
Age	20.12 (1.47)	20.17 (1.47)	20.09 (1.47)	0.632
Blood pressure(mm ofHg)				
Diastolic	75.14 (8.50)	79.22 (8.60)	72.71 (7.48)	0.000
Systolic	112.50 (11.5)	118.91 (10.20)	108.67 (10.64)	0.000
<b>Lipid Profile</b>				
Total cholesterol	156.16 (30.7)	158.17 (32.32)	154.96 (29.79)	0.373
Triglyceride	158.92(45.98)	159.89(45.95)	158.35 (46.10)	0.774
High density	40.10 (11.18)	40.85 (11.61)	39.65 (10.92)	0.358
<b>lipoprotein</b>				
Low density lipoprotein	85.70 (29.70)	85.54 (31.95)	85.84 (28.36)	0.931
<b>Blood Glucose</b>				
Fasting blood sugar	4.2 (0.85)	4.30 (0.91)	4.21 (0.82)	0.385
2 hour after break fast	5.41 (1.08)	5.58 (1.15)	5.30 (1.03)	0.036
<b>Anthropometry</b>				
BMI	23.24 (4.00)	23.34 (3.77)	23.18 (4.14)	0.731
Waist circumference	78.66 (12.43)	81.18 (12.55)	77.16 (12.15)	0.006
Waist hip ratio	0.82 (0.09)	0.85 (0.10)	0.81 (0.08)	0.000
Waist height ratio	0.48 (0.07)	0.48 (0.07)	0.49 (0.07)	0.091

**Table-III:** Distribution of the study subjects according to the anthropometric measurements

Parameter	Total subjects (n=313)			Male (n=117)			Female (n=196)		
	No	%	95% CI	No	%	95% CI	No	%	95% CI
Over weight	74	23.6	26.0 -21.2	27	8.6	10.18 -7.02	47	15.0	17.02 -12.98
BMI 25.0-29.9 Kg/m <sup>2</sup>									
Obese	16	5.1	6.34 -3.86	6	1.9	2.67 -1.13	10	3.2	4.19 -2.21
BMI > 29.9 Kg/m <sup>2</sup>									
Central Obesity	174	55.6	58.41 -52.79	96	30.7	33.31 - 28.09	78	24.0	26.41 -21.59
Waist circumference									
Male > 90 cm									
Female > 80 cm									
Central Obesity	109	34.8	37.49 -31.8	11	3.5	4.54 -2.46	98	31.3	33.92 -28.68
Waist Hip Ratio									
Male > 0.90									
Female > 0.80									
Central Obesity	112	35.8	38.51 -33.09	39	34.8	37.49 -32.11	73	65.2	67.89 -62.51
Waist Height Ratio									
Male > .50									
Female > .50									

**Table-IV:** Comparison of metabolic variables among study subjects based on central obesity

Parameter	Central obesity Yes (n=174)	Central obesity No (n=139)	P - Value
	Mean ( $\pm$ SD)	Mean ( $\pm$ SD)	
<b>Blood Glucose</b>			
Fasting	4.20 (0.82)	4.30 (0.90)	0.286
2 hr After breakfast	5.36 (1.08)	5.47 (1.09)	0.351
<b>Lipid profile</b>			
TC	154.52 (29.29)	158.21 (32.47)	0.291
TG	157.63 (48.68)	160.54 (42.46)	0.578
HDL	40.63 (11.46)	39.43 (10.81)	
LDL	84.56 (30.19)	87.20 (29.12)	0.347

A description of the general characteristics of the subject population is provided in table 1. The total sample size for the study was 313, of which an average age 20.12 years with standard deviation (SD) +1.472. Mean diastolic blood pressure 75mm of Hg (SD +8.5), Mean systolic blood pressure 112.5(SD +11.5), fasting lipid profiles where as mean total cholesterol 156.16mg/dl (SD +30.74), mean triglyceride 158.92 mg/dl (SD +45.98), mean high-density lipoprotein 40.1 gm/dl (SD +11.182), low-density lipoprotein 85.73 (SD +29.7). On glycemic status mean fasting plasma sugar 4.24 mmol/L (SD +0.858), mean plasma sugar 2 hours after glucose 5.41 mmol/L (SD +1.08). Whereas anthropometric measurement mean BMI 23.24 kg/m<sup>2</sup> (SD +4.00), mean waist circumference 78.7 cm (SD +12.43), mean waist hip ratio 0.83 (SD +0.0929) and waist height ratio .49(SD  $\pm$  .08).

Table 2 shows comparative study of all the parameters among both male & female. Total no of students were 313. Among them male were 117(37.4%) & female 197(62.6 %). Average age of male & female was 20 years. Mean diastolic blood pressure among male was 79.22( $\pm$ 8.60%) & female was 72.71( $\pm$ 7.48%) with p value of 0.000. Mean systolic blood pressure was 118.91( $\pm$ 10.20%) & 108.67( $\pm$ 10.64%) among male & female respectively.

Mean total cholesterol was 158.17(32.32) & 154.96(29.79); Mean TG level 159.89 ( $\pm$ 45.95) & 158.35 ( $\pm$ 46.10); mean HDL 40.85 ( $\pm$ 11.6) & 39.65 ( $\pm$ 10.92); mean LDL 85.54 ( $\pm$ 31.95) & 85.84 ( $\pm$ 28.36) between male & female respectively. P value  $>0.05$ . Fasting blood sugar level in male was 4.30( $\pm$ 0.91) & female was 4.21( $\pm$ 0.81) with p value of 0.385. Blood sugar 2 hrs breakfast level in male was 5.58( $\pm$ 1.15) & female was 5.30( $\pm$ 1.03) with p value of 0.036 ( $<0.05$ ). Anthropometric measurement between male & female shows mean BMI 23.34(3.77) & 23.18(4.14) with P value 0.731; mean waist circumference 81.18(12.55) & 77.16(12.15) with P value 0.006; waist hip ratio was 0.85 ( $\pm$ 0.10)& 0.81 ( $\pm$ 0.08) P value 0.000; waist height ratio was 0.48 ( $\pm$ 0.07)& 0.49 ( $\pm$ 0.07) P value 0.091 respectively.

Table 3 shows that according to BMI 27 males and 47 females are overweight (8.6%, CI - 10.18 - 7.02) & (15%, CI - 17.02 - 12.98). Number of obese males are 6 (1.9%, CI - 2.67 - 1.13) and females are 10 (3.2%, CI - 4.19 - 2.21). Central obesity (on the basis of WC) shows that 96 male students (30.7%, CI - 33.31 - 28.09) and 78 female students (24%, CI - 26.41 - 21.59) are centrally obese. According to Waist Hip ratio 31.3% female and 3.5% male & according to Waist Height ratio 65.2% female and 39% male are centrally obese.

A comparative study of metabolic variables based on central obesity represented in table 4. Total no. of centrally obese individuals are 174 and 139 students do not have any central obesity. Fasting blood sugar level was 4.20 ( $\pm$ 0.82) is centrally obese and 4.30(0.90) is non obese individuals (P - 0.286). Blood sugar 2 hours after breakfast was 5.36(1.08) and 5.47(1.09) is two groups respectively with a P value 0.351.

Lipid profile among the two groups shows mean TC level 154.52(29.29) and 158.21(32.47) (P=0.291), TG level 157.63 (48.68) & 160.54 (42.46) (P=0.578), HDL 40.63( $\pm$ 11.40) and 39.43(10.81) (P = 0.347), LDL level 84.56(30.19) and 87.20(29.12) (P value = 0.437) respectively.

## Discussion

The aim of the present study was to determine the prevalence of lipid and glycemic status, overweight and obesity in a sample of a private medical college student in Dhaka city.

The findings of our study shows that according to WC central obesity was 55.6%. Among them 30.7% are male and 24.5% are female, showing a significant difference between the two groups (p= 0.006). According to waist hip ratio 3.5% male and 31.3% female have developed central obesity (p value 0.000) shows a significant difference between the two groups. According to waist height ratio 30.4% of more females are centrally obese than males. Our study shows that according to BMI among 117 male students 27(8.6%) are overweight and 6(1.9%) are obese and among 196 female students 47(15.0%) are overweight and 10 students (3.25%) are obese. There are also significant difference of male and female BP. Diastolic and systolic blood pressure of male (79.22mm of Hg and 118.9mm of Hg), have high normal level than female(72.7mm of Hg and 108.6mm of Hg). This findings is consistent with the study of Greek ( high BP in males than female)<sup>4</sup>.

Though TG level is slightly high in both male and female (159.89mg/dl & 158.35mg/dl respectively) other lipid levels are normal. Blood glucose both fasting and two hours after breakfast is normal in all study subjects.

Our results showed that in general overweight and obesity proportions were high. Overweight and Obesity according to BMI and central obesity (WHR and WHtR) was more frequently encountered in females than males. Although more males are centrally obese according to waist circumference, in other two parameters females are more obese than males centrally. On the other hand obesity due to WC was significantly higher in males than females. These results are consistent with other studies. Wang et al<sup>18</sup> showed the vast increase in weight in overweight American adults was faster than in children and in women than in men. There is no significant relationship between metabolic variables and overweight and obesity.

## Conclusions

The epidemic of overweight and obesity is having a huge impact on the physical and social well-being of adult in future. Computer use, watching TV, physical activity and family factors are important risk factors for obesity. Obesity promotes insulin resistance, hypertension as well as dyslipidimia. Reducing obesity through life style changes is an important step for adult to prevent the development of non communicable disease<sup>16</sup>. Helping adult to achieve or maintain a healthy weight requires accurate identification by health care professionals and promotion of lifestyle modifications. Overweight and obesity remains a challenging problem in future, and more effective interventions are desperately needed. The medical students are mostly members of affluent society. They usually live sedentary life also they experience different types of physical and mental stress due to their duties.

## Recommendation

Student's awareness should be increased to reduce central obesity.

## References

1. Tamara S. Hannon, Goutham Rao, Silva A. Arslanian. Childhood Obesity and Type 2 Diabetes Mellitus. *Pediatrics* 2005; 116: 473
2. Steinberger J, Moran A, Hong CP, et al. Adiposity in Childhood predicts obesity and insulin resistance in young adulthood. *J Pediatr* 2001; 13
3. Guo SS, Wu W, Chumlea WC, et al. Predicting overweight and obesity in adulthood from body mass index values in Childhood and adolescence. *Am J Clin Nutr* 2002; 76: 653-8,8: 469-73.
4. Mohammad Y, Gharaibeh, Karem H, et al. Assessment of cardiovascular Risk Factors Among University Students: The Gender Factor. *Cardiol Res* 2012; 3(4): 172-179
5. Feliciano-Alfonso JE, Mendivil CO, Ariza ID, et al. Cardiovascular risk factors and metabolic syndrome in a population of young students from the National University of Colombia *Rev Assoc Med Bras* 2010; 56(3): 47-51.
6. I-Bayoumy I, Shady I, Lotfy H. Prevalence of obesity among adolescence (10-14 years) in Kuwait. *Asia Pac J Public Health* 2009; 21(2): 153-9.
7. Whitaker RC, Wright JA, Pempa MS, et al. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med* 1997; 337: 869-73
8. Rahman Al Nuaim A. Effect of overweight and obesity on glucose intolerance and dyslipidemia in Saudi Arabia, epidemiological study. *Diabetes Res Clin Pract* 1997; 36(3): 181-91
9. Sinha R, Fisch G, Teague B, et al, Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *N Engl J Med* 2002; 346: 802-10
10. Tailor AM, Peeters etabolic syndrome in children and adolescents. *Int J Pediatr Obes* 2010; 5(3): 202-13.
11. Lazzeri G, Rossi S, Pammolli A, et al. Underweight and overweight among children and adolescence in Tuscany (Italy). Prevalence and short-term trends. *J Prev Med Hyg* 2008; 49(1): 3-21.
12. Gundogan K, Bayram F, Capak M, et al. Prevalence of dyslipidimia and obesity among college students in Kuwait *Metab Syndr Relat Disord* 2009; 7(5): 427-34.
13. Liao CC, Su TC, Chien KL, et al. Elevated blood pressure, obesity and hyperlipidemia. *J Pediatr* 2009; 155(1): 79-83.
14. Pinhas-Hamiel O, Dolan LM, Daniels SR, et al. Increased incidence of non insulin-dependent diabetes mellitus among adolescents. *J pediatr*.1996; 128: 608-615
15. AL Rashdan I, AL Neseif Y. Prevalence of overweight, obesity and metabolic syndrome among adult Kuwaitis: results from community-based national survey. *Angtology* 2010; 61(1): 42-8
16. Al Majed HT, Al Attar AT, Sadek AA, et al. Prevalence of dyslipidemia and obesity among college students in Kuwait. *Alexandria Journal of Medicine* 2011; 47: 67-71.
17. Erem C, Hacıhasanoglu A, Deger O, et al. Prevalence of dyslipidemia and associated risk factors among Turkish adults: Trabzon lipid study. *Endocrine* 2008; 34(1): 36-51.