

Prevalence of Atherogenic Lipoprotein Phenotype among the Obese Medical Students in Bangladesh

Rajib Deb Nath¹, Nawrin Jahan Nishi², Sm Ashik Faysal³, Md Mobasser Hosain⁴, Md Rifat Al Mazid Bhuiyan⁵, Sushmita Roy⁶, Kartick Chanda shaha⁷

¹Upazila Family Planning Officer, Gowainghat, sylhet*

²Medical Officer, Department of Gynecology and Obstetrics, Ad-din Barrister Rofique-ul-Huq Hospital

³Manager, Lab operation and Business development, AI Khan Lab Limited

⁴Research Fellow, Department of Molecular Medicine and Bioinformatics, University of Development Alternative (UODA)

⁵Research Fellow, Department of Community Medicine, Rajshahi Medical College, Rajshahi

⁶Post Graduation Trainee, Ispahani Islamia Eye Institute and Hospital, Dhaka

⁷Associate Professor, Department of Pharmacology, Dhaka National Medical College

ABSTRACT

Background: Medical students are expected to be conscious about nutrition and healthy active life styles. So, study of obesity & atherogenic lipoproteins among medical students may reflect the prevalence of this cardiovascular risk factor in our population.

Objective: The aim of this study was to assess the prevalence of atherogenic lipoprotein phenotype among the obese medical students in Bangladesh.

Methodology: This descriptive type of Cross-sectional study was carried out at the Department of Biochemistry, Sylhet M.A.G Osmani medical College from July 2018 to June 2019. 100 obese medical students were the study population. Random sampling was done according to availability of the subjects. Data were collected through interviewing of the subjects. The collected data were entered into the computer and analyzed by using SPSS (version 20.1)

Result: Majority of the obese subjects (59%) were female. 'Atherogenic Lipoprotein Phenotype' components (increased TG, decreased HDL & predominance of small dense LDL) were-- 63%, 54% & 40% respectively. Prevalence of 'atherogenic lipoprotein phenotype' was found in 16% in total obese students. In male and female obese students, prevalence of 'athrogenic lipoprotein phenotype' was 14.63% & 16.95% respectively. In male obese students, mean value of TG, HDL & sd LDL (small dense LDL) were-- 177.37, 37.51 and 1.052 respectively. In obese female students, mean value of TG, HDL & sd LDL were-- 163.32, 38.64 and 1.085 respectively. There were no significant differences of any parameter between obese male and female students.

Conclusion: It may be concluded that, our young generation should be aware of atherogenicity due to considerable increased prevalence of obesity & atherogenic lipoprotein phenotype in medical students.

KEYWORDS: atherogenic lipoprotein phenotype, obese medical students, Prevalence

ARTICLE DETAILS

Published On:
19 February 2025

Available on:
<https://ijpbms.com/>

INTRODUCTION

Obesity may be defined as an increased amount body fat. Body mass index (BMI) or waist circumference (WC), or both may be used for assessment of obesity. The most frequently used definition of obesity is based on BMI¹. The

International Association for the Study of Obesity and the International Obesity Task Force have suggested lower BMI cutoff values for the definitions of overweight (23-24.9 kg/m²) and obesity (25.0 kg/m² or greater) in Asian populations². The World Health Organization has revised

Prevalence of Atherogenic Lipoprotein Phenotype among the Obese Medical Students in Bangladesh

the BMI cut-off for Asian Indians and suggested a BMI of 25 kg/m² or more to define obesity against the 30 kg/m² recommended for Europeans ³. Atherogenic lipoprotein phenotype is an integral part of metabolic characteristics of abdominal obesity, insulin independent diabetes & other insulin resistant states ⁴. The term ‘lipid triad’ or ‘atherogenic lipoprotein phenotype’ has been introduced to describe a common form of dyslipidemia, characterized by three lipid abnormalities: increased plasma triglyceride levels, decreased HDL cholesterol concentrations and the presence of small, dense LDL particles ⁵. Obese patients are often associated with low serum high-density lipoprotein (HDL) cholesterol levels. Low HDL cholesterol in obesity might be a risk factor for coronary heart disease ⁶. Obese individuals with a high accumulation of visceral adipose tissue tend to have hypertriglyceridemia & low concentration of high density lipoprotein cholesterol ⁷. Central abdominal obese patients often have plasma concentration of low density lipoprotein cholesterol in the normal range. They have an increased proportion of atherogenic small dense LDL particles and an increased concentration of apo-lipoprotein B. Therefore central abdominal obese patients have atherogenic plasma lipoprotein lipid profile ⁸. The majority of type-2 diabetic patients are overweight & the prevalence of diabetes is increasing in parallel with that of obesity. ⁹

MATERIALS & METHOD

This descriptive type of Cross-sectional study was carried out at the Department of Biochemistry, Sylhet M.A.G

Osmani medical College from July 2018 to June 2019. 100 obese medical students were the study population. Random sampling was done according to availability of the subjects. Data were collected through interviewing of the subjects. The collected data were entered into the computer and analyzed by using SPSS (version 20.1) to assess the prevalence of atherogenic lipoprotein phenotype among the obese medical students in Bangladesh. Fasting blood samples were collected from obese medical students to estimate serum lipid level. The study was approved by the institutional ethical committee. Body weight (in kg) was measured in light clothing and without shoes. The weight was recorded to the nearest kg. Height was measured without shoes with the subjects standing fully erect on a flat surface. Height was taken to the nearest centimeter. Body mass index was calculated by the formula. BMI = weight in kg / (Height x Height) in the meter. Normal BMI 18.5—22.9 Kg/ m², Underweight BMI <18.5 Kg/ m², Overweight BMI 23—24.9 Kg/ m², Obese-I BMI 25—29.9 Kg/ m², Obese-II BMI >30 Kg/ m².

RESULTS

According to figure 1, total numbers of obese subjects both male and female were 100. It comprised of 41 (41%) male and 59 (59%) female. So Majority of the obese subjects were female.

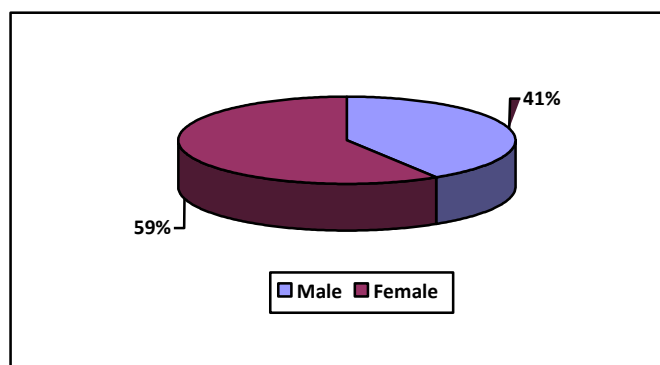


Figure 1: Sex distribution of the study subjects (n=100)

Table I shows the distribution of components of atherogenic lipoprotein phenotype in obese students. ‘Atherogenic Lipoprotein Phenotype’ components (increased TG, decreased HDL & predominance of small dense LDL) were-- 63%, 54% & 40% respectively. Among male students

(increased TG, decreased HDL & predominance of small dense LDL) were-- 68.29%, 56.09% & 39.02% respectively. Among female students (increased TG, decreased HDL & predominance of small dense LDL) were-- 59.32%, 52.54% & 40.67% respectively.

Table I: Distribution of components of atherogenic lipoprotein phenotype in obese students. (n=100)

Study groups	TG (>150mg/dl) N (%)	HDL (<40 mg/dl) N (%)	Sd LDL= (LDL /ApoB =<1) N (%)
Total obese (n=100)	63 (63%)	54 (54%)	40 (40%)

Prevalence of Atherogenic Lipoprotein Phenotype among the Obese Medical Students in Bangladesh

Obese Male (n= 41)	28 (68.29%)	23 (56.09%)	16 (39.02%)
Obese Female (n= 59)	35 (59.32%)	31 (52.54%)	24 (40.67%)

Table II shows the prevalence of 'atherogenic lipoprotein phenotype'. Prevalence of 'atherogenic lipoprotein phenotype' was found in 16% in total obese students. In

male and female obese students, prevalence of 'atherogenic lipoprotein phenotype' were 14.63% & 16.95% respectively.

Table II: Prevalence of atherogenic lipoprotein phenotype (ALP) of obese students (n=100)

Study groups	Prevalence of ALP(increased all components)	95% CI
Total obese (n=100)	16%	8.82 – 23.18%
Male obese (n=41)	14.63%	4.04 – 25.32%
Female obese (n=59)	16.95%	7.39 – 26.51%

In table III, comparison of components of atherogenic phenotype were presented between obese male & female students. In male obese students, mean value of TG, HDL & sd LDL (small dense LDL) were-- 177.37, 37.51 and 1.052

respectively. In obese female students, mean value of TG, HDL & sd LDL were-- 163.32, 38.64 and 1.085 respectively. There were no significant difference of any parameter between obese male and female students.

Table III: comparison of components of atherogenic lipoprotein phenotype between obese male & obese female students

Parameters	Male (n-41) mean±SD	Female (n-59) mean±SD	't' value	'p' value
TG mg/dl	177.37 ±50.058	163.32 ±30.421	1.73	.086
HDL-C mg/dl	37.51 ±6.132	38.64 ±6.268	.436	.351
sd LDL-C (LDL-C/Apo-B)	1.052 ±.2216	1.085 ±.2100	.760	.449

Unpaired t-test was done and $p < 0.05$ was the level of significance.

DISCUSSION

Atherogenic lipoprotein phenotype or 'lipid triad'—includes, coexisting raised triacyl glycerol, predominance of small dense LDL and low HDL. This specific lipid abnormality is a better indicator of lipid mediated risk factors for coronary heart disease than individual components of classical lipid profile parameters. In this study, females were found more obese. In a study on students of Lebanese University in Beirut, Yahia et al (2008) reported that, prevalence of overweight and obesity (overweight with BMI 25—29.9, and obese with BMI >30) was more common among male students than females (overweight and obese 37.7% and 12.5%, vs 13.6% and 3.2% respectively in male and females). It was claimed that female students were more conscious about their weight and figure¹⁰. In our study the prevalence of small dense-LDL was 40% among the obese students. The prevalence of atherogenic lipoprotein

phenotype was found 16% in obese students (14.63% of male & 16.95% of female students). Kang et. al (2002) reported that the prevalence of the small dense- LDL phenotype was 54% among the 80 obese youths. There was no significant difference of distribution of components of atherogenic lipoprotein phenotype between obese male & female students¹¹.

CONCLUSION

There is female predominance in the prevalence of obesity. Regarding atherogenic lipoprotein phenotype, there was no difference of components between males and females. This finding indicates that, both males and females are equally vulnerable for atherogenicity and its consequences. It may be concluded that, our young generation should be aware of atherogenicity due to considerable increased prevalence of obesity & atherogenic lipoprotein phenotype in medical

Prevalence of Atherogenic Lipoprotein Phenotype among the Obese Medical Students in Bangladesh

students. Students should be aware of harmful consequence of obesity in their future lives. Dietary & life style modifications can be adopted to prevent development of atherogenicity in future.

ACKNOWLEDGEMENTS

The authors are grateful to the entire staff of department of Biochemistry at Sylhet M.A.G Osmani medical College, Sylhet during the study period.

CONFLICT OF INTEREST

Authors declare no conflict of Interest.

AUTHORS CONTRIBUTIONS:

Data Gathering and idea owner of this study: **Rajib Deb Nath, Nawrin Jahan Nishi**

Study design: **Sm Ashik Faysal, Md Mobasser Hosain,**

Data gathering: **Rifat Al Mazid Bhuiyan , Sushmita Roy**

Writing and submitting manuscript: **Rajib Deb Nath , Kartick Chanda Shaha**

Editing and approval of final draft: **Rajib Deb Nath, Md Rifat Al Mazid Bhuiyan**

REFERENCES

- I. Vidal PM, Bochud M, Mooser V, Paccaud F, Wabber G, Voenweider P, 2008. 'Prevalence of obesity and abdominal obesity in the Lausanne population'. *BMC public health*, 8: 1-9.
- II. Jafar TH, Chaturvedi N and Pappas G. 2006, 'prevalence of overweight & obesity and their association with hypertension and diabetes mellitus in an Indo-Asians population' *CMAJ*, 175(9): 1071-1077.
- III. Mohan V and Deep R. 2006, obesity and abdominal obesity is Asian Indians.' *Indian J med res*, 123: 593-596.
- IV. Djeric M. 2003, pathophysiology & clinical significance of atherogenic lipoprotein phenotype & small dense LDL particles. *Jugoslov Med Biochem*, 22(2) :101-107.
- V. Rizzo M, Berneis K. 2005, 'lipid triad or atherogenic lipoprotein phenotype: a role in cardiovascular prevention'. *Journal atheroscler Thromb*, 12(5):237-9.
- VI. Arai T, Yamashita S, Hirano K, Sakai N, Kotani K, Fujioka S et al 1994, Increased plasma cholesteryl ester transfer protein in obese subjects. *Arterioscler Thromb* ,14 :1129-1136
- VII. Despres JP, Lemieux I and Prudhomme D. 2001, 'Treatment of obesity; need to focus on high risk abdominally obese patients.' *BMJ*, 322:716-20.
- VIII. Tchernof A, Lamarche B, Prud'homme D, Nadeau A, Moorjani S, Labrie F et al. 1996, 'The dense LDL phenotype. Association with plasma lipoprotein levels, visceral obesity and

hyperinsulinemia in men'. *Diabetes Care*, 19(6): 629-37.

- IX. Al-Sultan FA & Al-Zanki N. 2005, Clinical Epidemiology of type 2 Diabetes Mellitus. *Kuwait Medical Journal* , 37 (2):98-104.
- X. Yahia N, Achkar A, Abdallah A, & Rizk S. 2008, 'Eating habits & obesity among Lebanese University'. *Nutr J*, 7(32):1-9.
- XI. Kang H-S, Gutin B, Barbeau P, Litaker MS, Allison J and Le N-A. 2002, 'Low density lipoprotein particle size, central obesity, cardiovascular fitness and insulin resistance syndrome markers in obese youths'. *International journal of obesity*, 26(8): 1030-1035.