

STUDY OF BODY MASS INDEX (BMI) AND ITS ASSOCIATION WITH LIPID PROFILE AMONG MEDICAL STUDENTS IN NIZAMABAD

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Abstract

Background: Obesity is a state of excess adipose tissue mass that adversely affects health. Obesity is a strong risk factor for CVD (Cardio Vascular Disease). Lipid and its lipoprotein constituent are a mediator and a marker of CVD. One-in-five children and adolescents, globally, are overweight. Aim: To determine BMI (Body Mass Index) in medical students and its association with lipid profile parameters. **Methods:** In our study, we have included 108 students of phase I MBBS students. Height and Weight were measured using standard methods and BMI is calculated. Overnight fasting blood sample was analyzed for lipid profile parameters. **Results:** The students were divided into 3 groups based on the BMI. Group 1 includes 49 students with normal BMI value (18.5 to 22.9 kg/m²), Group 2 of 19 students with decreased BMI (< 18.5 kg/m²) and Group 3 of 40 students with increased BMI (>23 kg/m²) or overweight. In the present study, the prevalence of overweight students was 37% and more in females than in males. SPSS software was used for statistical analysis. ANOVA test was used to compare the lipid profile values between the 3 groups. A p value < 0.05 was considered statistically significant. The mean value of lipid profile parameters like Total Cholesterol, serum Triglycerides and Total Cholesterol/HDL in group 3 or overweight was significantly higher than the group 1 or normal weight students. The mean value of HDL cholesterol was lower in group 3 students when compared to group 1 students. **Conclusion:** This study revealed a higher proportion of overweight among medical students and lipid profile was significantly associated with BMI. Thus, it is important to inculcate healthy lifestyle with physical activity like regular sports, yoga classes, stress management classes and preventive health education as a part of the academic curriculum.

INTRODUCTION

Obesity is defined as a state of excess adipose tissue mass that can impair health. It is a risk factor for many diseases like Type-2 Diabetes Mellitus (D.M), Stroke, Cardiovascular disease (CVD), Metabolic syndrome and impaired fertility. Obesity is a Chronic complex disease, caused by many factors like genetic variants and environmental factors like over-eating or sedentary life-style.^[1] Obesity is measured by widely used indicators like Waist Circumference (W.C), Waist to Hip ratio (WHR) and Body mass index (BMI).² BMI or Quetelet's index is a surrogate

marker of adiposity calculated as weight (in kg)/height (in m²).^[2]

The prevalence of obesity is increasing world-wide in an epidemic proportion with huge economic burden. About 2.6 billion people globally are obese in 2020 and it may increase to over 4 billion people by 2035. Further, the main concern is that the rising prevalence of obesity among children and adolescents. One-in-five children and adolescents, globally, are overweight.^[3] Obesity was linked to 4.7 million deaths globally in 2017.^[4] In India, more than 135 million individuals were affected by obesity.^[5] In

India, it was found that 6.8% of adolescents were obese and about 17.1% were overweight.^[6]

Obesity is a strong risk factor for the development of CVD. It was proposed that marked increase in obesity prevalence among adolescents ultimately contribute to CVD risk into adulthood.^[7] Lipid and its lipoprotein constituent are a mediator and a marker of coronary heart disease.^[8] Lipid Profile includes Total Cholesterol (TC), Serum Triglycerides (TG), High Density Lipoprotein Cholesterol (HDL) or good cholesterol, Low Density Lipoprotein Cholesterol (LDL) or bad Cholesterol and Very Low-Density Lipoprotein Cholesterol (VLDL). Increased Total Cholesterol, LDL Cholesterol and decreased HDL Cholesterol is a marker for atherosclerotic CVD risk. Increased Serum Triglyceride itself may be a risk factor.^[9] Further, Total Cholesterol/ HDL ratio is an atherogenic index for CVD risk.^[10]

Abdominal obesity is one of the major risk factor for cardiovascular disease (CVD) in India.^[11] Improper dietary patterns, unhealthy food habits, and lack of physical activity are the major associated factors that increase the burden of obesity among adolescents.^[12] Approximately 60-70% of patients with obesity are dyslipidemic with elevated serum TG, non-HDL-C levels and decreased HDL cholesterol level.^[13] A lipid profile is an important test for screening, diagnosing, and managing CVD.^[14]

Need of the Study

As medical students are tomorrow's health educators, it is important to know the proportion of obesity in medical students.

Objectives

1. To determine BMI among medical students.
2. To measure lipid profile. and its association with BMI in medical students.

MATERIALS AND METHODS

This study was done at Government Medical College, Nizamabad after approval from Institutional Ethical Committee. In our study, we have included 108 students of phase I MBBS Students of Government Medical College, Nizamabad. The students who were willing to take part in the study voluntarily were selected after the informed consent. The students with previously diagnosed diabetes, hypertension or dyslipidemia with or without treatment were excluded from this study.

Study Parameters

A detailed history and general examination, followed by vital parameters was done for all the enrolled students. The Height of all the students was measured using height meter and Weight was recorded using digital weighing scale. BMI was calculated from height and weight, using the W.H.O formula ($BMI = \text{Weight in Kg} / \text{Height in m}^2$).^[2]

After an overnight fast of 12 hours, blood sample was collected from the median cubital vein under aseptic precautions. The study Parameter, Lipid Profile was

measured on Siemens Atellica autoanalyzer at Biochemistry laboratory in Government General Hospital, Nizamabad. Lipid Profile includes Serum Total Cholesterol, estimated by CHOD-POD method and Serum Triglyceride, estimated by GPO-POD method and HDL Cholesterol, by Enzyme Selective Inhibition method. VLDL Cholesterol, LDL Cholesterol were calculated using Friedewald's equation.^[9] Total Cholesterol / HDL ratio was calculated by dividing total cholesterol to HDL cholesterol. Baseline parameters like Blood Glucose, Serum Creatinine, Bilirubin and CBP (Complete Blood Picture) were done in all subjects.

The students were divided into 3 groups based on the BMI. The BMI is categorized as per revised Asia-Pacific guidelines into 15 –

1. Under weight - $< 18.5 \text{ kg/m}^2$
2. Normal BMI – $18.5 - 22.9 \text{ kg/m}^2$
3. Overweight – $23.0 - 24.9 \text{ kg/m}^2$
4. Obesity $\geq 25 \text{ kg/m}^2$

Group 1 includes 49 students with normal BMI value (18.5 to 22.9 kg/m^2) and Group 2 of 19 students with decreased BMI ($< 18.5 \text{ kg/m}^2$) and Group 3 of 40 students with increased BMI ($>23 \text{ kg/m}^2$) or overweight and obese group.

Statistical Analysis

The values were entered in Microsoft excel sheets. SPSS software was used for statistical analysis. ANOVA test was used to compare the lipid profile values between the 3 student groups. A p value < 0.05 was considered statistically significant.

RESULTS

In the present study, we included 108 medical students of different ages (17- 22 years) and both sexes (64 girls and 44 boys). The students were divided into 3 groups based on the BMI. Group 1 includes 49 students with normal BMI value (18.5 to 22.9 kg/m^2) and Group 2 of 19 students with decreased BMI ($< 18.5 \text{ kg/m}^2$) and Group 3 of 40 students with increased BMI ($>23 \text{ kg/m}^2$) or overweight and obese.

The [Figure 1] shows the proportion-rate of students in each group.

In the present study, 40 students out of 108 were overweight and obese. The prevalence of overweight and obese students is 37%. Further, we have observed more prevalence of overweight in females (27 students or 67.5%) than males (13 students or 32.5%). The demographics of group 3 (over weight) students is shown in [Figure 2].

The mean and S.D values of Lipid Profile Parameters of the 3 BMI groups were calculated and compared by ANOVA test. A p value < 0.05 was considered statistically significant. The results were given in [Table 1].

The Mean value of Total Cholesterol and serum TG in group 3 was significantly higher than the group 1 students. The mean value of HDL cholesterol was lower in group 3 students when compared to group 1

students but the value was not significantly associated.

The total cholesterol/ HDL ratio was significantly higher in group 3 when compared to group1 students.

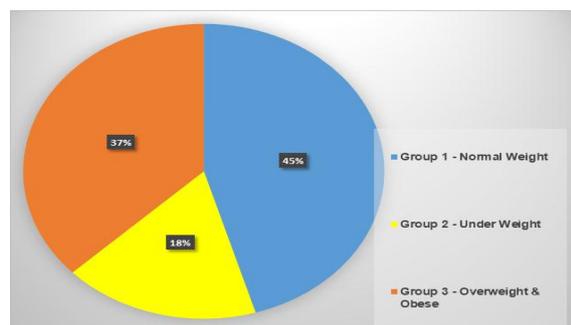


Figure 1: Proportion-rate of Students in each Group

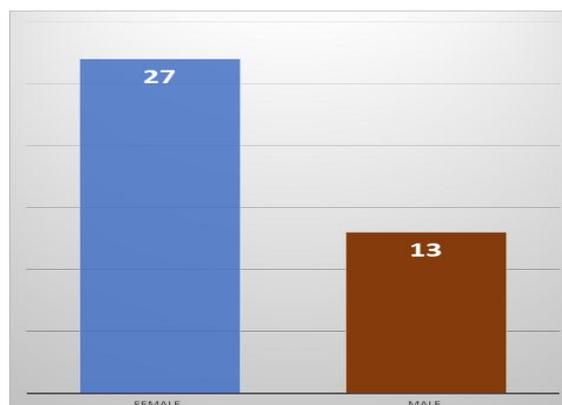


Figure 2: GROUP 3 Demographics (Over-weight & Obese)

Table 1: Comparison of Lipid Profile Parameters among 3 BMI Groups

Parameter	Group1 (n=49) BMI=18.5-22.9 kg/m ²	Group2 (n=19) BMI< 18.5 kg/m ²	Group3 (n=40) BMI > 22.9 kg/m ²	P value
Total Cholesterol	148.12 ± 25.76	139.74 ± 17.41	155.52 ± 22.50	< 0.05
Triglyceride	78.49 ± 20.99	77.10 ± 21.87	93.10 ± 23.89	< 0.05
HDL Cholesterol	34.29 ± 6.38	34.40 ± 7.77	32.65 ± 7.95	0.51
Total Cholesterol / HDL ratio	4.46 ± 1.11	4.19 ± 1.13	5.02 ± 1.23	< 0.05

DISCUSSION

Obesity is a chronic complex multi-factorial disease. It affects all ages and socio-economic groups. The prevalence of obesity and overweight has reached an epidemic proportion world-wide. BMI is a simple and widely used surrogate marker for Obesity.^[1,2]

In the present study, the proportion-rate of students as per BMI was calculated. [Figure 1] 45% of students were normal weight (BMI= 18.5 - 22.9 kg/m²); 18% of students were underweight (BMI < 18.5 kg/m²); and 37% of students were overweight and obese. (BMI > 22.9 kg/m²). Our study findings were consistent with other similar studies. Dumpala et al., have found 45% prevalence of overweight and obesity among medical students in their study.^[16] Parajuli K et al. in their study have found that overall prevalence of overweight and obesity among medical students was 23.6% and 5.2% respectively.^[17] Swati sonawane et al have found the prevalence of overweight and obesity to be 36.8% and 11.1%.^[18]

In the present study, out of the 40 overweight and obese students, 27 were females and 13 were males. [Figure 2] In our study, we have found overweight was more observed in females. But in other studies, overweight was seen more in boys when compared to girls. Parajuli K et al in their study found that overweight and obesity was more in males than females.^[17] Swati sonawane et al have found that Overweight and obesity were more observed in boys (48.8 %, 11.6%) than girls (30%, 10.55%) respectively.^[18]

Obesity is a risk factor for many diseases.1 Direct association between obesity and several diseases including diabetes mellitus, hypertension, dyslipidaemia and CVD are well recognized.19 cardiovascular disease (CVD) is one of the leading

causes of mortality and morbidity in Obese people. 3,7 Obesity is usually associated with Dyslipidemia or an unfavourable lipid profile, with an elevated serum Cholesterol, T.G, LDLC and a reduction in HDLC.^[19]

In the present study, lipid profile was measured in all the 3 groups of students. It was found that the mean value of Total Cholesterol and serum TG in group 3/ over-weight and obese students was significantly higher than the group1 or normal weight students. The mean value of HDL cholesterol was lower in group 3 students when compared to group 1 students but the value was not significantly associated. The total cholesterol/ HDL ratio was significantly higher in group 3 when compared to group1 students. [Table 1] Our results were consistent with other studies like Tejaswini B et al,^[20] and Eric Kwasi Ofori et al.^[21] BMI is a simple, non-invasive and an easy tool to measure and to identify overweight and obese individuals.^[2] Lipid Profile is a simple blood test which is widely available and cost-effective.^[9] Dyslipidemia indicates the impending CVD risk.^[9] So, those students with high BMI can be advised lipid profile to identify CVD risk at an early age. We can initiate preventive measures with a healthy lifestyle, increased physical activity and avoiding junk foods, proper sleep and stress management in such overweight and obese students.

Limitations of the Study: Small sample size, other associated factors like socioeconomic status, family history or lifestyle measures by students.

CONCLUSION

Medical students are more prone to obesity because of their stressful lifestyle and poor eating habits.^[22,23] BMI is a reliable tool to measure obesity. Obesity is

one of the major risk factor for CVD. Lipid profile is a simple test to screen the CVD risk.

It is important to inculcate healthy lifestyle for medical students in view of the increased susceptibility to become obese. So, MBBS curriculum should have regular sports with physical activity, yoga classes or stress management classes and preventive health education as a part of their academic curriculum.

BMI should be measured for all the medical students regularly to identify the overweight and obese students and take necessary preventive measures at an early stage and decrease the CVD risk.

Recommendation

BMI is a simple tool to measure obesity. It should be routinely assessed in all medical students at least every 6 months. Regular Sports, Yoga classes, stress management and preventive health education about the healthy lifestyle and proper eating habits should be a part of their MBBS curriculum.

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