

RELATION OF BODY MASS INDEX WITH LIPID PROFILE AND BLOOD PRESSURE IN YOUNG HEALTHY STUDENTS AT ZIAUDDIN MEDICAL UNIVERSITY

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Background: This study was conducted to assess serum lipids in healthy young subjects in relation with their BMI. Methods: Students of Ziauddin Medical University were assessed for anthropometric measures, blood pressure and lipid profile at the time of their admission for MBBS program. Results: Out of 426 students all parameters were available for 301 students and they were selected for analysis in this study. Mean serum cholesterol in 301 students was 149.3 \pm 31.3 mg/dl, mean LDL-C was 91.3 mg/dl \pm 27.7, mean HDL-C was 40.0 mg/dl \pm 42.2, mean triglycerides were 89.9 mg/dl \pm 42.2, mean systolic blood pressure was 113.1 mmHg \pm 13.5 and mean diastolic blood pressure was 74.0 mmHg \pm 8.1. The mean BMI of students was 21.6 Kg/m² \pm 4.2. Among 301 students, 88 were underweight, 175 were normal and 38 were overweight according to their BMI. We found no significant difference in mean serum cholesterol and LDL-C while there were significant difference in mean serum HDL-C, triglycerides, systolic and diastolic blood pressure among the three BMI groups. Conclusion: In our study, there are high numbers of at-risk individuals. Therefore, strategies should be designed for weight reduction in children and adults to prevent cardiovascular disease. Keywords: Body Mass Index, Lipid Profile, Healthy students

INTRODUCTION

Ischemic heart disease is the major cause of death in developed countries as well as in developing countries. Several studies have been conducted on Pakistani population, which prove that the mortality due to IHD in Pakistan is as high as in developed countries.¹⁻² There have been several risk factors reported like hypertension, diabetes mellitus sedentary life style and dyslipidemia.³⁻⁶

Lipids and lipoproteins are well known risk factors for ischemic heart disease. Elevated levels of triglyceride, cholesterol and LDL-C are documented as risk factors for atherogenesis.⁷ LDL-C in its oxidized or acetylated form has been identified as a major atherogenic particle, as it not only load macrophages with cholesterol for the formation of foam cells but also because it is chemotactic for circulating monocytes, is cytotoxic and can adversely alter coagulation pathways.⁸⁻¹⁰ The blood level of HDL-C in contrast bears an inverse relationship of the risk of atherosclerosis and coronary heart disease that is higher the level, smaller the risk.¹¹⁻¹²

Different plasma lipids vary significantly in various population groups due to difference in geographical, cultural¹³, economical, social conditions¹⁴, dietary habits and genetic makeup. Age and gender differences also affect serum lipids considerably.¹⁵⁻¹⁷ This study was conducted to assess serum lipids and blood pressure among the three BMI groups (underweight, normal and overweight) in healthy young males and females belonging to middle and higher socioeconomic group, admitted in a private medical college from 1996 to 2001.

MATERIAL AND METHODS

Four hundred and twenty six (152 male, 274) students between 17-22 years of age admitted in the first year program of a private medical university were included in this study. Their height, weight and systolic and diastolic blood pressures were recorded. Body Mass Index (BMI) was calculated by using their height (m²) and weight (kg). On the basis of BMI, all students were divided into three groups that is under weight whose BMI was less than 19 kg / m², normal whose BMI was between 19 and 26 kg / m² and overweight whose BMI was more than 26 kg / m².

After twelve hours fast, serum samples were collected and total cholesterol, HDL-C, LDL-C and triglycerides were estimated on photometer 5010 and 911-Hitachi autoanalyzer. Statistical analysis was done on Epi-Info-6. The means of the three groups were compared by ANOVA at the significance level of $\alpha = 0.05$. correlation coefficient was determined for the dependent variables of lipid profile and blood pressure with BMI (in kg/m²) as the independent variable.

RESULTS

The height and weight were available for 351 students and of 426 serum cholesterol was estimated in all students included in the study while, serum LDL-C, HDL-C and triglycerides was estimated in 371 students due to insufficient volume or turbidity of serum. Mean systolic and diastolic blood pressure was recorded in 347 students. There were 301 students in whom all parameter were available and they were selected for analysis in this study. Mean serum cholesterol

Table-1: Cholesterol, LDL-C, HDL-C, triglycerides, systolic blood pressure and diastolic blood pressure according to three BMI groups (Means \pm SD)

Variables	Under weight (BMI<19kg/m ²)	Normal (BMI19- 26kg/m ²)	Overweight (BMI>26kg/m ²)	p-value*
Cholesterol (mg/dl)	145.2 \pm 30.4	149.7 \pm 31.7	155.5 \pm 31.3	0.23
LDL-C (mg/dl)	87.3 \pm 29.2	92.2 \pm 22.6	95.4 \pm 27.5	0.26
HDL-C (mg/dl)	41.9 \pm 9.3	39.7 \pm 9.1	37.7 \pm 6.9	0.04
Triglycerides (mg/dl)	80.2 \pm 28.6	89.2 \pm 41.6	112.2 \pm 58.0	0.001
SBP (mmHg)	108.6 \pm 14.0	113.6 \pm 11.8	120.1 \pm 16.5	<0.001
DBP (mmHg)	71.7 \pm 8.3	74.5 \pm 7.9	76.0 \pm 7.8	0.01

*p-value calculated by ANOVA comparing the means of the variables for the three BMI groups

in 301 students was 149.3 mg/dl \pm 31.3, mean LDL-C was 91.3 mg/dl \pm 27.7, mean HDL-C was 40.0 mg/dl \pm 42.2 and mean triglycerides were 89.9 mg/dl \pm 42.2. Mean systolic blood pressure was 113.1 mmHg \pm 13.5 and mean diastolic blood pressure was 74.0 mmHg \pm 8.1. Though the total number of observations for all parameters was ranging between 347 to 425 but their means were not significantly different from the means of those 301 students whose all parameters were available.

The mean BMI of students was 21.6 kg/m² \pm 4.2. Among 301 students, 88 were underweight that is their BMI was less than 19 kg/m², 175 were normal that is their BMI was between 19 kg/m² and 26 kg/m² and 38 were overweight that is their BMI was more than 26Kg/m². Mean values of serum

cholesterol, LDL-C, HDL-C, triglycerides, systolic and diastolic blood pressure with their standard deviations according to three BMI groups are given in table-1. There were significant differences in mean serum HDL-C, triglycerides, systolic and diastolic blood pressure among three BMI groups ($P < 0.05$) but none in mean serum cholesterol and LDL-C. No significant correlation was found between any of the lipid profile variables and blood pressure variables with BMI.

DISCUSSION

There are few studies conducted in subjects whose age ranges between 20-30 years but they belong to lower socio-economic background, showed higher mean values of serum total cholesterol, LDL-C and triglycerides while, mean serum HDL-C was low.¹⁵ Mean systolic and diastolic blood pressure was in agreement with other studies.¹⁶⁻¹⁸

In this study, comparison of three BMI groups (underweight, normal and overweight) with regards to serum total cholesterol, LDL-C, HDL-C, triglycerides, mean systolic and diastolic blood pressure were also examined. Beaver County Lipid Study showed positive and significant association between BMI and triglycerides.¹⁹ Similarly, the Minneapolis Children's Blood Pressure Study also showed same results.¹⁷ Findings of our study are consistent with the previous studies as we also found no significant difference ($P > 0.05$) in serum total cholesterol and LDL-C but there is significant difference ($p < 0.05$) in mean serum HDL-C, triglycerides, mean systolic and mean diastolic blood pressure in three BMI groups. These findings can be explained by the results of certain studies that showed that hyperinsulinemia and insulin resistance are strongly correlated with obesity.²⁰⁻²³

It has been estimated that risk of myocardial infarction is 35% to 55% less in adults and normal weight as compared to obese adults.²⁴ However, the influence of obesity on cardiovascular risk begins before adulthood and overweight during adolescence is associated with an increased risk of coronary heart disease in male and female subjects.²⁵ As 12.6% students of our total study population are overweight, so number of at-risk individuals is much higher. Therefore, strategies designed to limit cardiovascular risk should address weight reduction during childhood and adolescence.

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