



## A STUDY OF ASSOCIATION BETWEEN SERUM LIPID PROFILE WITH BODY MASS INDEX AND WAIST-CIRCUMFERENCE IN HEALTHY YOUNG ADULT.

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**ABSTRACT** Progressive urbanization and adoption of a “western” lifestyle contributes to rising burden of cardiovascular disease (CVD) in the developing world. There is an increasing trend of CVD in young adults in Indian population as compared to Western countries. The present study was carried out to find out the range of serum cholesterol in healthy young subjects in the age group (20-35) years and to see the correlation of serum lipid profile with body mass index and waist circumference. The study was carried on 100 healthy subjects. The age, weight, height, body mass index and waist circumference of the subjects were noted and TC, TG, HDL, LDL were estimated in each subject. The mean lipid profile values of normal weight cases were compared with that of overweight and obese subjects, and a significant differences was noted ( $p < 0.01$ ). The present study also showed a positive correlation between waist circumference and BMI ( $p < 0.001$ ).

**KEYWORDS :** WC waist circumference, BMI body mass index, TC total cholesterol, TG triglyceride, HDL high density lipoprotein, LDL low density lipoprotein.

### INTRODUCTION

Cardiovascular diseases are the major cause of death in our society. Progressive urbanization and adoption of a “western” lifestyle contributes to rising burden of cardiovascular disease (CVD) in the developing world.<sup>1,2,3</sup> In India, the death rate from CVD has increased at an alarming rate and is estimated currently as 52 per cent (Gupta, 2001).<sup>4</sup> Cardiovascular risk factors start early, track through the young age and manifest in middle age in most societies. CVD in developing countries are characterized by early age of onset and greater mortality.<sup>5</sup> Worldwide data reveals that while more than 70% deaths in high income countries occur after the age of 70 years, in low and middle income countries more than 70% deaths occur below this age.<sup>5,6</sup> One of the major risk factors for cardiovascular diseases is Hyperlipidemia. Hyperlipidemia leads to the development of atherosclerosis and later to the progression of coronary cardiovascular morbidity and mortality. It is estimated that, annually hypercholesterolemia causes 56% of ischaemic heart diseases and 18% strokes. The effect of obesity on cholesterol and triglycerides levels is complex. The relationship between degree of overweight and development of CHD may be modified by age, sex, body fat distribution, degree of fitness and ethnicity. The childhood roots of adult obesity and also CVD are widely recognized which calls for health promotion targeted at youth. There are various anthropometric methods for assessment of obesity. Body mass index (BMI) and waist circumference are two most widely used methods.

The burden of death and disability due to CVD continues to increase globally and in absence of suitable preventive effort, it will not be controlled. Also not much data is available in the literature regarding the anthropometric measurements of young adults. So proper screening for the risk factors for CVD at an early age can decrease the morbidity and mortality by modifying the unhealthy lifestyle.

**AIMS AND OBJECTIVES:** The present study was done to find out if there is any correlation between levels of lipid profile and body mass index and waist circumference.

**MATERIALS AND METHODS:** In the present study 100 subjects of 20-35 years of age were selected in around the Dibrugarh town. Out of the 100 subjects 50 were male and 50 were female. The subjects having history of diabetes mellitus, hypertension or any other disease were excluded from the study. The individual was kept fasting for 8-12 hours prior to the test. Only water was permitted. About 3 ml of blood was collected from the antecubital vein. The collected blood was centrifuged and was tested for fasting Serum cholesterol, Fasting serum Triglycerides, High density lipoprotein cholesterol (HDL-C),

and Low density lipoprotein cholesterol (LDL-C) by Cholesterol oxidase-peroxidase Method (CHOD-PAP method), GPO/PAP method, PEG/CHOD/PAP method, Friedewald’s formula respectively. FRIEDEWALD’S FORMULA:

$$\text{LDLchol} = \text{Totalchol} - \text{HDLchol} - \text{TG}/5$$

The BMI of the subjects was measured and waist circumference was measured with the help of standard measuring tap at the level of the umbilicus or the highest point of the iliac crest.

**RESULT:** In the present study 100 subjects of both male and female were selected and their anthropometric measurement, BMI, waist circumference and lipid profile were measured. In the present study out of 100 cases 50 were female and 50 were male. The mean height, weight, BMI and waist circumference in male subjects were 1.63±0.08cm, 64.4±9.62kg, 24.8kg/m<sup>2</sup>, 79.7±11.6 cm and that of female subjects were 1.63±0.08cm, 51±6.0kg, 19.4kg/m<sup>2</sup>, 73.4±7.7cm respectively.

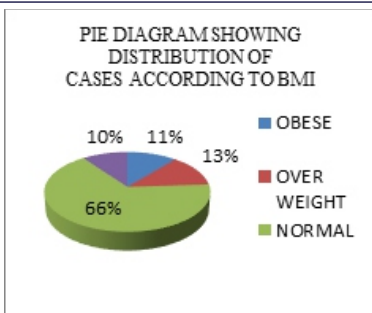
**Table no1: showing the anthropometric measurement in the study population:**

Parameter	Male	Female
No. of cases	50	50
Mean Age (in years)	24	22
Mean Height (in meters)	1.63	1.63
Mean Weight (in kg)	64.4	51
Mean BMI (kg/m <sup>2</sup> )	24.5	19.4
Mean Waist-circumference (incm)	79.7	73

In the present study out of 100 subjects 10 were underweight (BMI<18.4), 66 were normal (BMI18.5-22.9), 13 were overweight (BMI23-24.9), 11 were obese (BMI>25). The mean lipid profile values of normal weight cases were compared with that of overweight. Unpaired two-tailed t- test was performed to find the p-value. Significant differences was noted between two categories ( $p < 0.01$ ).

**Table no2: showing the distribution of population according to BMI**

BMI (kg/m <sup>2</sup> )	No. of cases	Percentage (%)
Under weight (<18.4)	10	10
Normal (18.5-22.9)	66	66
Overweight(23-24.9)	13	13
Obese (>25)	11	11
Total	100	100



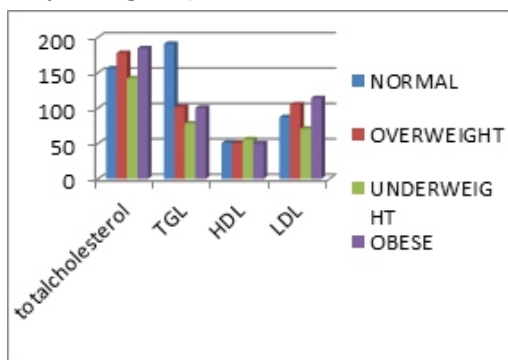
Again the mean lipid profile values of normal weight cases were compared with that of obese. Here again, significant differences was noted between the two categories ( $p < 0.01$ ).

Thus, there is positive correlation between serum lipid profile and BMI.

**Table no3: Showing the distribution of Lipid profile according to BMI of all cases:**

Parameter (mg/dl)	BMI				P-value	
	Normal (18.5 - <22.9)	Over weight (23-<24.9)	Under weight (<18.4)	Obese (>25)	Normal Vs Over weight	Normal Vs Obese
Total cholesterol	155.9	177.6	142.2	184.5	<0.01	<0.01
TGL	190.6	101.4	78.2	100.2	<0.01	<0.01
HDL	50.7	50.4	55.7	50.2	<0.01	<0.01
LDL	87.1	105.1	70.9	113.9	<0.01	<0.01

In males the cut off margin for waist circumference (WC) was 90cm. males having WC > 90cm categorised as overweight and those having WC < 90cm categorised as normal. In the present study 37 man had WC < 90cm and 13 had WC > 90cm. there was a positive correlation between waist circumference and serum lipid profile ( $p < 0.01$ ). in case of female cut off for waist circumference was 80cm. 36 female had waist circumference < 80cm and 14 female subjects had waist circumference > 80cm. it had been found that there is positive correlation between waist circumference and serum lipid profile in female subjects too ( $p < 0.01$ ).



**Discussion:** In the present study, according to WC 72% (36 cases) female cases were found to be normal weight (<80), and 28% (14) cases were found to be overweight ( $\geq 80$ ). In case of male, 74% (37) cases were normal weight (<90) and 26% (13 cases) were overweight ( $\geq 90$ ). With increasing WC, there is significance rise of TC, TGL, HDL and LDL in both the sexes.

Darren R Brenner et al (2010)7 studied 1181 healthy men (n = 358) and women (n = 823) aged 20-29 years, and found that WC had a stronger association with serum lipid concentrations than BMI. WC was significantly related to TG and TC:HDL cholesterol after adjusting for BMI and covariates among men and women ( $P \leq 0.01$ ). However, after adjusting for WC and covariates, BMI was not significantly associated

with the two serum lipid measures. WC was a better predictor of TG and TC:HDL among all sexes.

In present study it showed that a strong association between BMI and TC, TGL, HDL, and LDL. It is found that serum TC, TGL, LDL significantly increase with increasing BMI. There was also significant fall in HDL-C in both sexes who were overweight. These result corroborate with the findings of Bertias G et al (2003)83 and Gupta et al (2009)8.

This study suggest that the influence of obesity on cardiovascular risk factors begins in early childhood and overweight during adolescence is associated with increased risk of CHD in both males and females.

Bhattacharya S et al (2007)9 have shown a strong association between BMI and TC, TGL, HDL-C, LDL-C and they have considered it to be a key parameter for predicting the cardiovascular risk.

A. Abubakar et al (2009)10, on their study, on comparison of three BMI groups (underweight, normal and overweight) with regards to serum total cholesterol, LDL-C, HDL-C, triglycerides found that there is positive and significant association between BMI and triglycerides which is similar to the findings of Donahue et al. (1985) and Prineas et al. (1980)., this study 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, and triglycerides in three BMI groups.

Mishra et al. (2002) studied the association of anthropometric profile with hyperlipidemia in 50 non-obese Asian Indian males (BMI < 25 kg/m<sup>2</sup>) and compared with that of normolipidemic males (n=50; BMI < 25 kg/m<sup>2</sup>). Results revealed that BMI and Waist-circumference were significantly higher in hyperlipidemic subjects as compared to normolipidemic controls. Hence Asian Indian males, defined as “non-obese” based on BMI, had adverse profile of anthropometric parameters compared to normolipidemic males.

**Conclusion:** Substantial proportion of young adults was overweight. Overweight and obese young adults had significantly higher levels of TC, TGL, LDL-C and low HDL-C. BMI is a useful index for dyslipidemias in both males and females. The childhood roots of adult obesity and also CVD are widely recognized which calls for health promotion targeted at youth. Among study populations, 13% were overweight and 11% were obese, so the number of at-risk individuals is much higher. So the crucial factors is the age at which screening and intervention strategies should be initiated, and it should be extended to the general population.

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