Original Research Article

Study of body mass index (BMI) and serum lipid profile of patients at a tertiary hospital: a cross sectional study

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ABSTRACT

Background: Sedentary lifestyle have an impact on the prevalence and incidence of obesity related disorders and leads to the development of type 2 diabetes mellitus, dyslipidemias and metabolic disorders that aggravate the risk in the development of cardiovascular diseases (CVD).
Methods: In our study, data of 220 subjects belonging to age group of 25 to 55 years were collected. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Subjects were categorized into two groups (BMI <25 and BMI ≥25). Serum was separated by centrifuging blood at 3000 rpm for 10 min and analyzed for lipid profile on Erba Chem 7 semi-auto analyzer.
Results: In our present hospital based study we estimated the Lipid Profile in individuals categorized into two groups. (Group 1 BMI <25) and (Group 2 BMI ≥25), We found the values of Triglycerides, LDL and VLDL in Group 1 are lower as compared to Group 2.
Conclusions: Our study showed positive correlation between lipid profile and obesity. Obesity is said to predispose individuals to metabolic syndrome associated diseases.

Keywords: BMI, Cholesterol, HDL, LDL, Triglycerides, VLDL

INTRODUCTION

Measuring weight and height in relation to body mass index (BMI) gives valuable information regarding the health status of an individual. There are many evidences that an increased level of BMI is associated with a wide range of factors associated with heart diseases, diabetes, asthma and backache.[1]

Lipids and various lipoproteins are well known risk factors for cardiovascular diseases. Different researchers in their studies show that deranged levels of total cholesterol, triglyceride (TG) and low density lipoprotein (LDL) are risk factors for coronary artery diseases.[2]

In the present era Modern civilization has achieved more and more comfort for the day to day activities, but these advantages have led to profound modifications in the way of life style. The transition between the search for the food to fed (and the consequent expenditure of energy) for easy access to fast food that usually contains high refined carbohydrates and fat content was quickly observed. Allied to this, there was also a drastic reduction in the physical activity of the modern age man. Leads to increase in their weight and leads to obesity in both developing and developed countries.[3]

According to the current estimates up to 1.7 billion peoples are overweight or obese in both developing and

developed countries i.e. Obesity is alarmingly increasing worldwide. Over 115 million peoples are obese and have problems associated with obesity in developing countries, Overweight problem is increasing continuously at an alarming pace.[4] The prevalence of increase in weight and obesity is increases alarmingly. Obesity is presently estimated to be the second leading cause of morbidity and mortality, causes an estimated death of around 2.6 million population worldwide and there is around 2.3% of global burden of disease.[5]

Obesity leads to metabolic syndrome which has widely become prevalent in the recent decades.[6] Reduction in day to day physical activity and increase in the using of high calorie junk food disrupt the homeostatis of the body.[7] Obesity is associated with a variety of metabolic disorder related diseases like type2 diabetes mellitus (T2DM), hyperlipidemia, hypertension, and coronary artery diseases (CAD), all of them are life threatening diseases.[8]

Researchers in their various studies have shown that increased level of BMI is associated with higher serum cholesterol and LDL. The aim of the present study was to determine the association between BMI and lipid profiles.

METHODS

After obtaining ethical clearance from institute, total of 220 subjects, belonging to the age of 25 years to 55 years were randomly selected from OPD of medicine department of FH medical college Agra. Informed written consent from subjects was obtained. Body mass index was calculated as weight in kilograms divided by the square of height in meters $(kg/m^2)^9$. They were categorized into two groups on the basis of BMI (group 1 BMI <25) and (group 2 BMI ≥25). Information about subject's age, sex, monthly income, life style, family history of diabetes and other chronic diseases/disorders were recorded. Height, weight and waist circumferences were measured with the subject barefooted and lightly dressed. The abdominal circumference (waist) was measured at the end of expiration, by wrapping the tape at the level of the umbilicus.

Blood sample (3ml) was collected in plain vial from each subject. Serum was separated by centrifuging blood at 3000rpm for 10 min. The participants were asked to take fast for 12 hours prior to blood sample taken for lipid profile. Lipid profile was analyzed on Erba Chem 7 semi-auto analyzer from Trans Asia India. The data was analyzed using SPSS-17 software package.

RESULTS

Total cholesterol mean ±SD value of subjects having BMI less than 25 are 181±5.6 where as it is 190±6.1 in patients having BMI more than or equal to 25, triglycerides Mean ±SD value of subjects having BMI less than 25 are 133±7.9 where as it is 205.3±4.9 in

patients having BMI more than or equal to 25, High density lipoprotein (HDL) Mean ±SD value of subjects having BMI less than 25 are 41.1±2.6 where as it is 29.7±1.5in patients having BMI more than or equal to 25 respectively. Low density lipoprotein (LDL) and very low density lipoprotein (VLDL) Mean ±SD value of subjects having BMI less than 25 are 99.3±4.6 and 26.4±1.6 whereas LDL and VLDL value of BMI more than or equal to 25 are 110.1±2.4 and 36.9±1.2 respectively (Table 1).

Table 1: Mean±SD values of lipid profile parameters in groups categorized by BMI value.

Parameters	BMI	
	<25	≥25
Total cholesterol	181±5.6	190±6.1
Triglycerides	133±7.9	205.3±4.9
HDL	41.1±2.6	29.7±1.5
LDL	99.3±4.6	110.1±2.4
VLDL	26.4±1.6	36.9±1.2

DISCUSSION

In our present hospital based study, we estimated the lipid profile in individuals categorized into two groups. (group 1 BMI <25) and (group 2 BMI ≥25). We found the values of triglycerides, LDL and VLDL in group 1 are lower as compared to group 2 values.

Different researchers in their studies have shown an association between BMI and lipid profile, and also the association between lipid profile and body fat distribution had been much discussed during the past few decades, both lipid profile and body fat have been shown to be the important predictors for metabolic disturbances including dyslipidemia, hypertension and various chronic diseases like diabetes, cardiovascular diseases, hyperinsulinaemia etc.[10]

Our study showed positive correlation between lipid profile and obesity. Obesity is said to predispose factors in individuals leads to metabolic syndrome associated diseases like diabetes and heart diseases.[11] Our study revealed that subjects having overweight had positive correlation with HDL, LDL, total cholesterol and triglyceride. The relationship between overweight and LDL was significant. Obesity correlated positively with HDL and LDL. This was in accordance with a finding which showed that BMI correlated positively with TC and LDL-C.[12] Type 2 diabetes mellitus is characterized by dyslipidemia the level of which is associated with BMI.[12] The study by Udiong also showed that Cholesterol levels are correlate with BMI indicates that the lipid levels are influenced by BMI.

Another study showed that positive correlations between, when BMI >25kg/m^{2} and VLDL in the total study group.[13] Plasma lipids were positively correlated with

BMI and artherogenic indices, except for HDL-C, which was negatively correlated to artherogenic indices, while LDL-C was positively correlated with BMI in another study.[14] Our finding was also in accordance with the study which shows a proportional correlation between serum triglyceride level and BMI, with the highest triglyceride levels observed in overweight and obese patients.[15]

CONCLUSION

Our study results demonstrated that the BMI is associated with serum lipid profile and lipid profile was significantly higher in patients who were have BMI ≥25 except for HDL which is low in subjects having higher BMI, As BMI increases plasma LDL, total cholesterol and triglyceride and VLDL increases but HDL is inversely proportional as it is decreases.

Obesity increases metabolic syndrome risk through risk factors such as increased fasting plasma triglycerides, high LDL cholesterol, VLDL cholesterol and low HDL cholesterol. Obese individuals having dyslipidemia are more prone to develop CVD.

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