CORRELATION OF LIPID PROFILE & BODY MASS INDEX (BMI) OF PATIENTS AT A TERTIARY CARE HOSPITAL: A CROSS SECTIONAL STUDY

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Abstract

Background: Sedentary daily life have an impact on the prevalence and incidence of metabolic syndrome disorder and results in development of type 2 diabetes mellitus, Dyslipidemia and metabolic disorders that aggravate the risk in the development of cardiovascular diseases (CVD).

Methods: In our study Data of 92 males and 112 females, from the age group of 25 to 55 years were selected from December 2018 to July 2019 in a cross sectional manner. Blood sample (3 ml) was collected from each subject. Serum was separated by centrifuging blood at 3000 rpm for 10 min and analyzed for lipid profile by Siemens Dimension RXL max, wet chemistry analyzer. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters.

Results: In our 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 for same analytes.

Conclusion: Our study found positive correlation between lipid profile and obesity. Results of this cross sectional study again prove that, Obesity predisposes individuals to metabolic syndrome associated ailments.

Keywords: BMI, Lipid Profile, Metabolic Syndrome, Obesity, Dyslipidemia

INTRODUCTION:

Modern world have achieved more benefits and comfort for the day to day activities, but these advantages have led to profound modifications in the way of life. The human metabolic adaptations from cavemen, searching food (and the consequent energy expenditure) for survival to modish 21st century industrialized gentlemen, fond of fast foods with easy access (that usually contain high refined sugar and fat contents) has been changed dramatically. Allied to this, there is also a drastic reduction in physical activity which leads to increase in weight and obesity in both developing and developed countries. [1]

Recent estimations suggest that up to 1.7 billion people are overweight or obese in both developing and developed countries i.e. Obesity is increasing worldwide as epidemic. Over 115 million people are obese and have problems associated with obesity in

developing countries. Overweight problem is increasing incessantly at an alarming pace in all spectrum of age in rural and urban areas. [2]

Overweight and obesity related changes have an impact on the incidence of metabolic disorders such as the development of type 2 diabetes mellitus, lipid profile changes and metabolic disorders that aggravate the risk for the development of cardiovascular diseases, which are the most common chronic-degenerative diseases. Moreover, the increase in visceral adiposity and the resistance to insulin action lead to an increase in oxidative stress and generate a low-grade inflammatory process that will result in an increase in metabolic changes leading to non-cardiovascular diseases also. [3-5]

Thus, a study was planned to observe the relationship among lipid profile and BMI in patients coming to our hospital in NCR region of India.

Material and Methods

A total of 297 subjects who were willing to take part in the study and who had given informed written consent were chosen, out of which 204 patients not having any chronic disease were randomly selected. Data of 92 males and 112 females, from the age group of 25 to 55 years were selected from December 2018 to July 2019 in a cross sectional manner. Information about subject's age, sex, monthly income, lifestyle and family history of lifestyle disorders 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.

Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters.

Blood sample (3 ml) was collected from each subject. Serum was separated by centrifuging blood at 3000 rpm for 10 min and analyzed for parameters of lipid profile by Siemens Dimension RXL max, fully automated wet chemistry analyzer in our NABL accredited biochemistry laboratory.

Result

Total Cholesterol Mean $\pm$ SEM value of subjects having BMI less than 25 are 161 ± 4.6 where as it is 180 ± 3.1 in patients having BMI less than or equal to 25, Triglycerides Mean $\pm$ SEM value of subjects having BMI less than 25 are 143 ± 9.9 where as it is 195.3 ± 5.9 in patients having BMI less than or equal to 25, High Density Lipoprotein (HDL) Mean $\pm$ SEM value of subjects having BMI less than 25 are 43.1 ± 1.6 where as it is 38.7 ± 0.5 in patients having BMI less than or equal to 25 respectively. Low Density Lipoprotein (LDL) and Very Low Density Lipoprotein (VLDL) Mean $\pm$ SEM value of subjects having BMI less than 25 are 89.3 ± 3.6 and 28.4 ± 1.9 where as LDL and VLDL value of BMI less than or equal to 25 are 102.1 ± 2.6 and 38.9 ± 1.1 respectively (Table 1).

Table 1: Mean $\pm$ SEM Association between biochemical and anthropometric parameters.

Parameters	BMI	
	<25	≥ 25
TOTAL CHOLESTEROL	161 ± 4.6	180 ± 3.1
TRIGLYCERIDES	143 ± 9.9	195.3 ± 5.9
HDL	43.1 ± 1.6	38.7 ± 0.5
LDL	89.3 ± 3.6	102.1 ± 2.6
VLDL	28.4 ± 1.9	38.9 ± 1.1

Table 2 shows that the levels of triglycerides, HDL, LDL and VLDL parameters of patients with altered values for Total cholesterol. We observe that subjects having higher level of Total cholesterol have very high level of Triglycerides as compared to LDL and VLDL.

Table 2: Mean $\pm$ SEM Association between anthropometric and biochemical parameters

Parameters	Total Cholesterol	
	<200	≥ 200
TRIGLYCERIDES	156.9 ± 4.7	237 ± 11.5
HDL	40.6 ± 0.5	41.1 ± 1.4
LDL	97.4 ± 2.0	136.2 ± 3.6
VLDL	34.0 ± 1.0	47.2 ± 2.3

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 lower in Group 1 as compared to Group 2.

Previous 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, hyper insulinemia etc.[6-7]

Our study found positive correlation between lipid profile and obesity. Obesity is said to predispose individuals to metabolic syndrome associated diseases like diabetes. [7]

Our study revealed that subjects who are overweight had positive correlation with HDL, LDL, total cholesterol and Triglyceride values. 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.[8] Type 2 diabetes mellitus is characterized by dyslipidemia the level of which is associated with BMI.[8] The study by Udiong et al(2015) also showed that cholesterol levels correlates with BMI which indicates that the lipid levels are influenced by BMI.

Y Himabindu et al (2013) in their research found that positive correlations were seen only between BMI > 25kg/m² and VLDL in the total study group. [9]

Plasma lipids were positively correlated with BMI and atherogenic indices, except for HDL-C, which was negatively correlated to atherogenic indices and LDL-C but was positively correlated with BMI in another study by El Ugwuja et al (2013).[10] Our finding are also in accordance to the study by ZU Ali et al(2011) which shows a proportional correlation between serum triglyceride level and BMI, with the highest triglyceride levels observed in overweight and obese patients.[11]

Conclusion

Our study results demonstrated that the BMI is positively associated with lipid profile and lipid profile values were significantly higher in patients having BMI ≥ 25 except for HDL, which is low in subjects having higher BMI. It can be concluded that if BMI increases plasma LDL, Total Cholesterol, Triglyceride and VLDL values also goes up but HDL values decreases.

Obesity increases metabolic syndrome via increasing risk factors such as increased Triglycerides, high LDL-Cholesterol, high VLDL-Cholesterol and low HDL-Cholesterol. Obese individuals having dyslipidemia are more prone to develop CVD is a pre-established fact in medical literature.

BMI can be used for screening of dyslipidemia along with other various risk factors associated with metabolic syndrome.

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