Original Research Article

Assessment of the Lipid parameters in Normal and Obese Male individuals - An Analytical Study

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Abstract:

Background: Over the past three decades, obesity has spread throughout the world. Obesity is associated with both macro- and microvascular problems, and vascular dysfunction is thought to be a major contributing factor to the increased risk of obesity-related death and disability. The purpose of the study was to identify the lipid profile pattern in obese people. We sought to study the lipid parameters and compare them to the healthy controls of the same ethnicity because obesity is a significant predisposing risk factor for coronary heart disease (CHD). **Aim:** The study was aimed at determining the pattern of lipid profile in the obese male and normal healthy volunteers. **Materials and methods:** The study was done after getting approval from Institutional Scientific and Ethical committee and was conducted in OPD at Madras Medical college and hospital. Males between 30-60 years (20 with obesity chosen as per WHO classification of BMI ≥ 30 as study group and 20 healthy individuals as comparison group). Under strict aseptic precautions, 4ml of venous blood was taken to assess their lipid profile (total Cholesterol, triglycerides, HDL, LDL and VLDL) using Enzymatic calorimetric method. Data analysis was done by SPSS. **Results:** Independent t-test was done to compare the mean of lipid profile parameters in obese and control group. Data was analyzed for mean and standard deviation for all parameters. There was a significant difference between the lipid parameters of study and control group. The mean of obese group ($t(TC)=-13.17$, $p < 0.0021$, $t(TGL)=-11.84$, $p < 0.0040$, $t(VLDL-C) =-10.26$, $p < 0.0054$, $t(LDL-C) =13.66$, $p < 0.0072$) was higher and the mean of obese group $t(HDL)= -15.26$, $p < 0.0013$ was lower than the mean of control group. Thus, the obese group were associated with a statistically significant ($p<0.05$) larger mean than the control group. **Conclusion:** This study emphasise the significance of taking lipid profile in treating metabolic diseases. To conclude that obese participants showed a positive relationship in BMI and lipid profiles.

Keywords: BMI, CHD, HDL, LDL, TC, TGL, VLDL

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Introduction :

Being overweight is the definition of obesity. Obesity has been defined by the World Health Organization (WHO) as a chronic disease that is becoming more widespread worldwide and taking the place of conventional health concerns.[1] It is closely associated with cardiovascular issues. Individuals who have cardiovascular disease generally have a higher body weight in their youth and are more likely to become obese in adulthood. According to estimates, heart disease (CHD) will become the primary cause of death in developing

nations.[2] Over 80% of the world's cases of CHD are in low-income affluent countries, but developed nations are primarily responsible for the knowledge of significant risk factors. Geographic variations exist in the frequency of CHD risk factors.[3]

Factors that can be changed to reduce the risk of atherosclerosis include levels of lipid in the blood. Triglycerides, phospholipids, cholesterol, and cholesterol esters are hydrophobic substances that are transferred to different tissues by lipoproteins.[4] The three main classes of lipoproteins are called after the types of lipids and apo proteins they include, as well as the sites at which they assemble: chylomicrons (CM), low density lipoproteins (LDL), and high density lipoproteins (HDL).[5]

Triacylglycerols, which the liver produces from excess fatty acids (FA), combine with phospholipids, free, and esterified cholesterol to form very low densitylipoprotein (VLDL) in addition to several different apo proteins.[6] As the lipoprotein moves through the peripheral tissues, the triacylglycerol component is hydrolyzed. lipase (LPL) into VLDL remnants and FA remnants produce intermediate density lipoproteins (IDL) when triglyceride contents are further hydrolyzed and LDL.[7] ApoB100 apo protein component present in LDL is the main peripheral circulation transporter of cholesterol.[8]

Many lipid/lipoprotein abnormalities have been found to be common in obesity and heart issues; these abnormalities are commonly referred to as dyslipidemias. Nevertheless, these dyslipidemias are frequently hyperlipidemias, in which the majority of lipids are moved toward the upper limits of the range or higher than the range.[9]

Globally, metabolic illnesses are highly prevalent due to a combination of factors including a distinct ethnicity, transit accessibility, and recent lifestyle modernization. This has a significant impact on everyday tasks, productivity at work, and interpersonal relationships.[10] The typical dyslipidemia of obesity consists of increased triglycerides (TG) and FFA, decreased HDL-C with HDL dysfunction and normal or slightly increased LDL-C with increased small dense LDL. The current review will focus on general lipid metabolism, the pathophysiological changes in lipid metabolism seen in obesity. Given the significance of lipid characteristics in the emergence of nutritional problems, the goal of the current study was to look into the lipid profile patterns in the obese male.

Materials and methods:

The study was done after getting approval from Institutional Scientific and Ethical committee and was conducted in OPD at Madras Medical college and hospital. Males between 30-60 years (20 with obesity chosen of BMI ≥ 30 as per WHO classification as study group and 20 healthy volunteers with BMI between 25 to 30as comparison group). Blood samples were taken to assess their lipid profile (total Cholesterol, triglycerides, HDL-C,LDL-C and VLDL) was measured using Enzymatic calorimetric method. After that,the pattern of dyslipidemia was investigated by contrasting the findings from both group. Data analysis was done by SPSS. The normality of the quantitative data was examined and was applied to the appropriate variables.

Inclusion criteria:

1. Male gender
2. Age group 30 – 60 years
3. BMI ≥ 30 as per WHO classification

Exclusion criteria:

1. Age < 30 and > 60 years
2. Female
3. Any Chronic disorders and Endocrine disorders
4. Diabetes, hypertension, coronary heart disease

5. BMI of 25 to 29.99as per WHO classification
6. Smokers, alcoholic

Prior to beginning the study, the participants were informed and obtained written consent. For greater comprehension, the questions were explained to them in their mother tongue. Additionally, the subjects were told that the information gathered would be kept confidential. There were 20 men categorized with BMI ≥ 30 considered as case group and age matched healthy 20 men with same inclusion criteria were considered as control group.

Under sterile precautions about 4ml of venous blood was collected from both study and control group. Blood samples were taken to assess their lipid profile (total Cholesterol, triglycerides, HDL-C,LDL-C and VLDL).The serum was separated by centrifugation and stored in deep freezer and was measured using Enzymatic calorimetric method.The enzymatic method is the principal method used for measuring cholesterol levels in plasma, where cholesterol is solubilized in an aqueous solution through its incorporation in lipoproteins.

Data were collected, entered, and tabulated in MS Excel and analysed using SPSS software (version 20). The continuous variables were expressed in mean and standard deviation. Independent t- test was applied to identify the association difference between the variables of BMI and the prevalence of lipid profile parameters were calculated. P-value < 0.05 was considered as statistically significant.

Results:

Table 1: Basic characteristic features of both case and control group

	Cases (n= 20)	**Controls (n= 20)**	**p-value**
	MEAN ± SD	**MEAN ± SD**	
Age	21.19 ± 3.54	22.42 ± 2.32	0.542
Weight (kg)	52.2 ± 7.2	50 ± 6.4	0.243
Height (cm)	161.4 ± 3.3	161 ± 2.4	0.865
BMI	34.07 ± 14.76	21.94 ± 12.14	0.062

P = <0.05 (significant)

Table 2: Mean and Standard Deviation of both Case and Control group

Variable	**Obese (n=20)**	**Controls (n=20)**	**t value**	**p value**
TC (mg/dl)	248.4 ± 28.30	155 ± 14.30	-13.17	<0.0021
TGL (mg/dl)	199.55 ± 26.88	110.85 ± 19.95	-11.84	<0.0040
HDL-C (mg/dl)	33.95 ± 12.54	113.2 ± 19.53	-15.26	<0.0013
LDL-C (mg/dl)	159.85 ± 25.50	76 ± 10.10	13.66	<0.0072
VLDL-C	62.8 ± 19.32	14.25 ± 8.56	-10.26	<0.0054

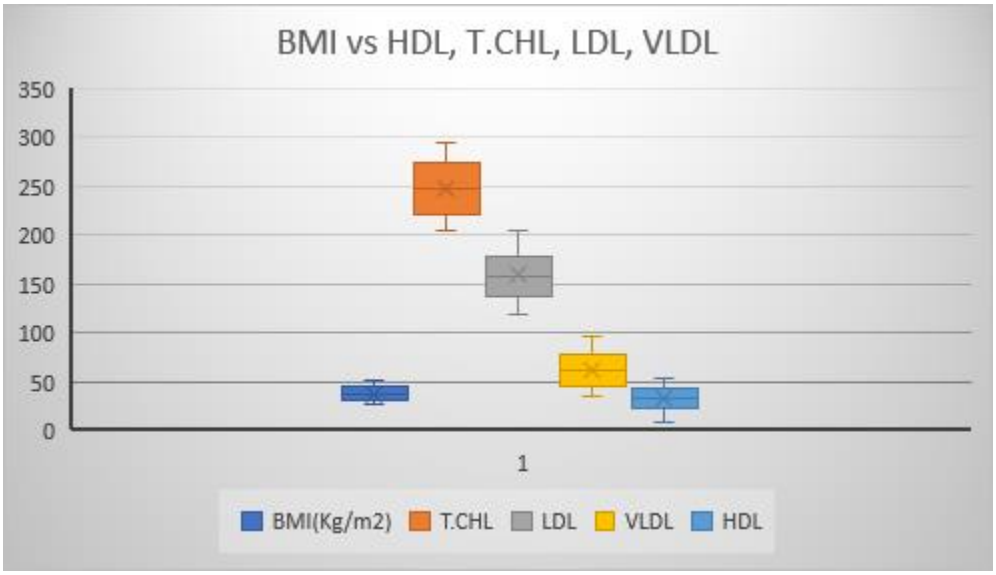
P = <0.05 (significant)

Independent t-test was done to compare the mean of lipid profile parameters in obese and control group. Data was analyzed for mean and standard deviation for all parameters. There was a

significant difference between the lipid parameters of study and control group.

The mean of obese group (t(TC)=-13.17, p < 0.0021, t(TGL)=-11.84, p < 0.0040, t (VLDL-C) =-10.26, p < 0.0054, t(LDL-C) =13.66, p < 0.0072) was higher and the mean of obese group t(HDL)= -15.26, p < 0.0013 was lower than the mean of control group. Thus, the obese group were associated with a statistically significant P value (p<0.05) than the control group.

CHART 1: BMI vs HDL, T.CHL, VLDL, TGL



Discussion:

It has been demonstrated that abnormalities in the lipid profile, particularly hypertriglyceridemia and low HDL-C levels, are a significant risk factor for diabetes, cardiovascular disease and obesity. According to estimates, for every 1 mg/dL elevation of HDL-C, the risk of CVD drops by 2 to 3%. In spite of some disagreement**,** increased triglyceride levels, fasting, and Non-fasting seems to pose a separate risk as well CHD risk factor.[11] Epidemiologic research data indicates that the co-occurrence of high levels of triglycerides and low levels of HDL-C are a powerful CHD risk factor**.**[12]

A significant proportion of men were discovered to be afflicted with the illness. This does not appear to be coincidental; rather, it indicates that males in the chosen study group and the broader population have a higher prevalence of the illness. Males may be more likely than females to have secondary causes, such as lower HDL-C levels and higher mean TC, LDL-C, smoking rate, and DM values. Additionally, this could result in different lipid profiles in men and women.[12]

The lowest levels of HDL-C and elevated triglycerides major coronary event rate. In the present investigation, elevated TG levels are frequently associated with low HDL levels, which frequently coexist with raised plasma glucose levels.[13] This is because high blood sugar, causes cholesterol esters to be transferred from HDL-C to VLDL particles. HDL is further reduced in concentration as a result of hepatic lipase breaking it down into tiny particles that are quickly removed from plasma.[14] The small, dense LDL-C particles that are formed when cholesterol ester is depleted from VLDL particles are absorbed by macrophages in the artery wall, leading to atherogenesis.[1]

Conclusion:

Small dense LDL development, reduced circulating TG lipolysis, and hepatic overproduction of VLDL are all part of the complex pathophysiology of the usual dyslipidemia seen in obesity. The goal of treatment should be to lose weight by better eating habits, more activity, and a decrease in overall caloric intake. If lifestyle modifications are not enough, medical therapy may be started. The main medications that decrease cholesterol are statins, which effectively lower LDL and residual cholesterol levels. Furthermore, in cases of persistent dyslipidemia in individuals with diabetes mellitus, increased TG, and decreased HDL-C levels, the addition of fibrates may be taken into consideration. Targets for treatment should be HDL-C concentrations since they more accurately reflect the atherogenic lipid burden in obesity than LDL-C alone does.

Limitations:

The small sample size is not large enough to completely rule out small gender-related variations**.** The fact that the study was conducted in a community and included a moderate number of participants was its main strength. However, the interpretation of the study's findings about causal linkages is constrained by its cross-sectional nature. Larger sample sizes for prospective longitudinal research should therefore be used going forward. Lastly, even in the presence of abnormal, but not statistically significant, lipid levels, we did not compute novel lipid ratios such as the Atherogenic Index of Plasma (AIP), Castelli Risk Index (CRI) I & II, and Chol Index, which may also be problematic.

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Conflict of interest: Nil

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