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Original Research Article

Comparative Study of Serum Lipid Profile of Obese and Non-Obese Students (Male) of Aljouf University

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Abstract

Background: The prevalence of obesity has risen dramatically in past several decades. Hormonal and genetic factor are rarely the cause of childhood obesity. Because obese adult may suffer lifelong physical and emotional consequences, this imperative to discuss prevention with parents during well- child examinations.
Objectives: Purpose of the study was to compare the Serum lipid profile of obese and non-obese males.
Materials and methods: Twenty two male students were selected from AL-Jouf University. Their age ranged from19 to 29 years. They were divided into groups. One group (N=15) having more than 20% fat was considered as obese group, another group (N=7) was considered as non-obese group. Fasting blood samples were analyzed for blood cholesterol, triglycerides, low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C), using chemistry analyzer, BS-300 Chemistry Analyzer.
Results: Of obese group, significant higher cholesterol and triglycerides were observed compared to non obese group. On the contrary, obese group had significant lower HDL-C concentration than the non-obese group. The adult obese has relatively larger changes in serum lipids at any given level of obesity.
Conclusion: On the average, the more fat, the more likely an individual will be dyslipidemic and to express elements of the metabolic syndrome. Increased triglycerides level in obese impaired lipolysis which reduced the HDL-C concentrations.
Keywords: Obesity, Serum Lipid Profile, Al-Jouf, HDL, LDL.

1. Introduction

Obesity refers to excess of body-fat. It is due to greater energy intake compared with energy expenditure. Despite inbuilt feedback system, how energy intake becomes chronically disproportionate is not properly understood [1]. It is difficult to study obesity because the abnormality is not a single disease and because the result of long-term follow up in large scale is not available in the existing literature. The knowledge that is available today is only a cross-sectional survey in the population. Obesity currently threatens the health, well- being and economic welfare of virtually every country in the world [2,3]. Over 300 million people are estimated to be obese. As a result, up to 1.7 billion of the world's population is at an increased risk of other life-threatening diseases such as heart attack and stroke [4,5]. Obesity means accumulation of excess fat on the body. Obesity is considered a chronic (long-term) disease, like high blood pressure or diabetes. It has many serious long-term consequences for health, and it is the second leading cause of preventable deaths in many countries (tobacco is the first) [6,7]. The BMI is the body weight in kilograms divided by the square of the height in meters (weight/(height) [2]. Obesity is defined as having a body mass index (BMI) of greater than 30 kg/m2. Healthy weight is defined as a BMI between 19 and 25 kg/m2. Overweight is defined as a BMI between 25 and 30 kg/m2.

Although the exact biochemical mechanisms responsible for the association between obesity and the above diseases have not been completely elucidated, it is known that increase in triglyceride stores is associated with a linear increase in the production of cholesterol which in turn is associated with increased cholesterol secretion in bile and an increased risk of gallstone formation and the development of gall bladder diseases [8,9]. Similarly, increased levels of circulating triacylglycerol in obesity are associated with decreased concentrations of high-density lipoprotein, which may account for the increased risks for cardiovascular disease and heart attack in obese patients [10, 11].

Cholesterol levels should be measured at least once every five years in everyone over the age of 20. The screening test that is usually performed is a blood test called a lipid profile. Experts recommend that men aged 35 and older and women aged 45 and older be more frequently screened

for lipid disorders [12]. The lipoprotein profile includes: LDL (low-density lipoprotein cholesterol, also called "bad" cholesterol), HDL (high-density lipoprotein cholesterol, also called "good" cholesterol), Triglycerides and Total cholesterol. LDL cholesterol can build up on the walls of your arteries and increase your chances of getting heart disease. That is why LDL cholesterol is referred to as "bad" cholesterol. The lower your LDL cholesterol number, the lower your risk. Optimum level of LDL cholesterol is less than 100, borderline high is between 130 and 159, high level is between 160 and 189 and very high level is above 190. For people with diabetes or other multiple risk factors for heart disease, the treatment goal is to reach an LDL of less than 100, although some physicians will be more aggressive [13, 14]. When it comes to HDL cholesterol "good" cholesterol the higher the number, the lower your risk. This is because HDL cholesterol protects against heart disease by taking the "bad" cholesterol out of your blood and keeping it from building up in your arteries. HDL cholesterol level is less than 40 in men, 50 in women. Triglycerides are the chemical form in which most fat exists in food and the body. A high triglyceride level has been linked to higher risk of coronary artery disease. Triglycerides less than 150 are considered as normal, mildly high between 150-199, high between 200 and 499 and very high above 500. Total blood cholesterol is a measure of LDL cholesterol, HDL cholesterol, and other lipid components. Accordingly, the objective of the study was to compare the Serum lipid profile of obese and non-obese male students of Aljouf University.

2. Materials and methods

Samples were taken from 20 subjects comprising two groups, group I (obese individuals) and group II (non-obese individuals as a control group). Data collected by structural interviewing questionnaire. Ethical approval for the study protocol (conducted between February 2013 and May 2013) was obtained from the Faculty of Applied Medical Sciences, Aljouf University. Informed consent was obtained individually from all participants prior taking blood specimens.

Six ml of blood was taken from each overnight fasting individual in a sterile and clean additive plain tube blood test container. Serum fraction was separated in 20 minutes by centrifugation (3000RPM/5min) and stored at -20°C until the time of analysis. Twelve hrs fasting serum was collected to avoid an elevation in triglycerides. Prolonged tourniquet application was avoided to avoid the increase in plasma lipid concentration prior sample collection. The rest for half an hour was also considered to avoid the elevation in plasma lipid concentration.

The concentration of TC, TG, HDL-C were measured, using BS-300 Chemistry Analyzer at the chemistry Lab, Faculty of Applied Medical Sciences, Aljouf University. LDL-C was calculated indirectly by the method of friedwald *et al*. (1972) as shown below.

The results were recorded in the master sheet and the information fed to the statistical software program SPSS (version 21), frequencies were calculated as descriptive in all the results.

3. Results

The total cholesterol was significantly higher (198.0mg/dl) in group 1 in comparison with the group 2 (165.6 mg/dl), $p<0.05$ (See Table 1). Triglycerides were also significantly higher (146.6 mg/dl) in group 1 compared to the group 2 (102.8 mg/dl), $p<0.05$. LDL-C was found to be significantly higher (117.4mg/dl) in group 1 compared to the group 2 (105.5mg/dl), $p<0.05$. But a significantly lower value (34.8mg/dl) was obtained in group 1 compared to the group 2 (40.4mg/dl), $p<0.05$ for HDL-C.

Table 1: Comparison of lipid levels (mg/dL) on Obese and Control Individuals

Parameters	Group I (± SD)	Group I I (± SD)
Total Cholesterol (TC)	198.0 (4.0) [(a)]	165.6 (9.9)
HDL-Cholesterol	34.8 (2.3) [(a)]	40.4 (2.5)
LDL-Cholesterol	117.4 (2.9) [(a)]	105.5 (3.1)
Triglycerides	146.6 (5.5) [(a)]	102.8 (5.6)

Key: *Significance determined by comparison of each parameter in the group I with the corresponding parameter in the group II. (a) = P<0.05.*

**Statistical significance shown in parenthesis.*

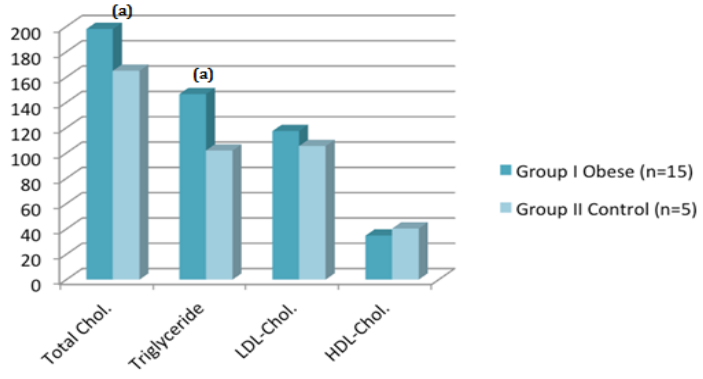

Figure 1: Comparison of lipid profile of Obese group versus healthy control group.

Key: *Significance determined by comparison of each parameter in the group I with the corresponding parameter in the group II. (a) = P<0.05.*

**Statistical significance shown in parenthesis.*

4. Discussion

When various parameters of blood lipid profile were compared it was observed that there was significant difference between obese in comparison to non-obese individuals. The Obtained value of total cholesterol, triglycerides, low density lipoprotein and high density lipoprotein level were found to be different in obese and non obese. In fact from table 1, it was observed that there is a significant high level of cholesterol and triglycerides. It was also viewed that there is relatively small increase in level of low density lipoprotein (dense LDL-C). On the contrary, it was observed that there is a significant lower level of high density lipoprotein (HDL-C) in obese group as compare to high level of high density lipoprotein (HDL-C) in non-obese group. The obese has relatively larger changes in serum lipids at any given level of obesity. On the average, the more fat, the more likely an individual will be dyslipidemic and to express elements of the metabolic syndrome. Increased triglycerides level in obese impaired lipolysis which reduced the HDL-C concentrations. Cardiovascular risk factor reports in obese individuals have recently demonstrated a remarkable number of metabolic abnormalities that embrace differences in lipids, glycemia, insulin, blood pressure, and hematologic function In view of hyperlipidaemia and hypercholesterolaemia that occur in obesity, it is a risk factor for atherosclerosis. In fact, obesity is associated with an increase in the incidence of coronary heart disease, congestive heart failure and strokes.

5. Conclusion

Although much work has been done to elucidate the differences between complexes pathogenesis of the dyslipidemia of obesity, more human studies are still needed. Within the limitation of the present study, it was concluded that obesity leads abnormalities in plasma lipids and lipoprotein.

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