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Study of Lipid Profile in Obese Patients

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Abstract: Background: The prevalence of obesity has risen dramatically in past several decades. Obesity is accumulation of excess body fat, due to greater calorie intake when compared to the calorie expenditure leading to increased BMI. The metabolic defect in obesity includes altered lipid profile along with increased cardiovascular disease, diabetes, hypertension, dyslipidemia. In this study we have tried to find out association of lipid profile and BMI with obesity.
Aim and objectives: Purpose of the study is to find out the lipid profile of 100 patients and correlate it with their BMI.
Materials and methods: This study was conducted in the Darpan laboratory, Anand during June 2017 to December 2017. 100 patients' blood sample were taken for lipid profile. Serum was separated and serum lipid profile levels were estimated by RA-50, Automated Chemistry Analyzer. We have grouped our subjects in 4 groups as per their BMI: Normal weight, Overweight, Class-1 obesity and Class-2 obesity. Lipid profile data were analyzed with MS excel and compared for different subject groups.
Result: Highly significant elevations were observed in the values of BMI, Total cholesterol, TG, LDL, in Class-2 obesity compared to Normal weight, Overweight, and Class-1 obesity. The level of HDL were lower in Class-2 obesity compared to Overweight and Class-1 obesity.
Conclusion: Obesity is associated with increased lipid profile and BMI except HDL. Therefore, patients presenting with this biochemical abnormality are recommended to be investigated for obesity and vice versa.
Keywords: Obesity, BMI, Serum Lipid profile.

I. INTRODUCTION

Overall the global prevalence rate of obesity is 3.3% reportedly. Some countries especially in Middle East, Latin America and North America have higher rates. Overweight is showing an increasing global trend[1]. There were 20 million obese women in india in 2014 compared with 9.8 million obese men, according to study of published in British medical journal, the lancet [2]. 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 disease such as heart attack and stroke [3,4]. Obesity refers to excess of body-fat. It is due to greater energy intake compared with energy expenditure [5]. Obesity increases the risk of cardiovascular disease and diabetes [6] especially when the extra fat is accumulated to central and intra-abdominal depots [7,8]. The increased cardio-metabolic risk in obesity is at least partly mediated through atherogenic dyslipidemia characterized by an increase in plasma triglycerides, large very low density lipoprotein (VLDL) particles, small dense low density lipoprotein (LDL) particles as well as low concentration of high density lipoprotein (HDL) cholesterol [9]. The origin of obesity and related dyslipidemia is multifactorial [10]. Not all obese individual develop dyslipidemia and not all dyslipidemic patients are obese.

The lipid 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 walls of your arteries and increase chances of getting heart disease and so called as "bad" cholesterol. For people with diabetes and other multiple risk factor for heart disease, the treatment goal is to reach an LDL of less than 100mg/dl, although some physician will be more aggressive [11,12]. When it comes to HDL cholesterol is "good" cholesterol 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. Triglycerides are the chemical form in which most fat exist in food and the body. A high Triglycerides level has been linked to higher risk of coronary artery disease. Total blood cholesterol is a measure of LDL cholesterol, HDL cholesterol and other lipid component.

The BMI is the body weight kilograms divided by the square of the height in meters (weight/height) [13]. Obesity is defined as having a body mass index (BMI) of greater than 30 kg/m^2. Healthy weight is defined as a BMI between 19 and 25 kg/m^2. Overweight is defined as a BMI between 25 and 30 kg/m^2.

Obesity is currently threatening the health, well-being and economic welfare of virtually every country in the world [13,14].

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II. MATERIALS AND METHODS

This study was done in the Darpan laboratory, Anand during June 2017 to December 2017. Total 100 patients were studied for lipid profile and BMI. Both the genders and all age group were included in the study BMI was calculated using weight/height^2 formula and defined as below:

BMI (kg/m^2)	Groups
<18.5	Underweight
18.5-24.9	Normal weight
25.0-29.9	Overweight
30.0-34.9	Class-1 obesity
35.0-39.9	Class-2 obesity
≥40.0	Class-3 obesity

Informed consent was obtained individually from all patients prior taking blood specimen Blood was collected in plain container after overnight fasting. The serum was collected and processed for various in plain tube for lipid profile and serum is separated. The concentration of serum total cholesterol, S.TG, S.HDL were measured using RA-50, Automated chemistry analyzer at the Darpan laboratory, Anand. LDL cholesterol was calculated indirectly by method of friedwald equation (1972). LDL- C= Total cholesterol- HDL cholesterol- TG/5.

III. RESULTS

Table 1: Mean value of various biochemical parameters (n=100)

Parameters	Normal weight(n=39)	Overweight (n=34)	Class-1 obesity(n=20)	Class-2 obesity(n=7)
S.Cholesterol (mg%)	148.81±30.65	183.47±42.18	183.8±53.15	208±18.69
S.Triglycerides (mg%)	136.10±60.21	155.64±61.70	165.95±92.45	218.57±65.59
S.HDL (mg%)	43.42±15.04	46.59±12.80	44.00±7.80	43.34±5.86
S.LDL (mg%)	75.76±26.32	103.11±39.91	97.3±35.76	120±12.64
BMI (kg/m^2)	22.60±1.72	26.98±1.41	31.71±1.26	36.92±1.67

Table 2: Comparison among the groups (n=100)

Parameter	Normal weight & Overweight	Overweight & Class-1 obesity	Class-1 obesity & Class-2 obesity	Class-2 obesity & Normal weight
BMI	<0.0001	<0.0001	<0.0001	<0.0001
S.CHO	<0.0001	0.9800	0.2543	<0.0001
S.TG	0.1718	0.6251	0.1795	0.0019
S.HDL	0.3393	0.4170	0.8403	0.9891
S.LDL	0.0008	0.5941	0.4744	<0.0001

Table 3: Person's correlation of BMI with Lipids (n=100)

Pair	Normal weight	Overweight	Class-1 obesity	Class-2 obesity
	r^2 Value	r^2 Value	r^2Value	r^2 Value
BMI vs S.CHOL	0.036	0.0074	0.0003	0.3381
BMI vs S.TG	0.0785	0.0018	0.0977	0.0023
BMI vs S.HDL	0.0029	0.0007	0.0329	0.4569
BMI vs S.LDL	0.0165	0.0062	0.0006	0.0924

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IV. DISCUSSION

Lipid Profile was studied is 100 random patients, We have classified the patients on the basis of BMI vs Underweight, Normal-weight, Overweight, Class-1 obesity, Class-2 obesity, Class-3 obesity. Table-1 shows the mean values for all the parameters in the 4 groups. According to this table, Mean values of BMI for Class-2 obesity, Class-1 obesity, Overweight and Normal weight are (36.92±1.671), (31.71±1.261), (26.98±1.410), and 22.60±1.722 respectively.

We found significant high mean values for total S. Cholesterol, S.TG, S.LDL in Class-2 obesity compared to Normal-weight, Overweight & Class-1 obesity.

Mean S.HDL values were low in Class-2 obesity compared to Overweight and Class-1 Obesity.

Similar results were found in a study carried by Bhatti MS, Akbari MZ, Shakoor M on BMI and Lipid profile among obese and non-obese taking BMI>25 Kg/m^2 as cut off for obese. They found out that all lipid profile parameters S.TG, S. Cholesterol, S.VLDL and S.LDL showed significant increase in obese patient group except S.HDL for which the level showed significant decrease with BMI. [15]

We found significant difference ($p<0.001$) between Normal-weight & Overweight and Class-2 obesity & Normal-weight While not significant ($p>0.05$) between Overweight and Class-1 obesity and between Class-1 & Class-2 obesity for S. Cholesterol and S.LDL.

S. Cholesterol values were significantly different ($p<0.001$) when mean values were compared of 2 groups. i.e. Normal weight vs Overweight and Class 2 obesity Vs Normal weight. However, Mean S. Cholesterol value did not show significant difference between 2 groups that is Overweight vs Class 1 obesity and Class 1 obesity vs Class 2 obesity.

Significant difference in the mean value of S. TG was observed in between Class-2 obesity Vs Normal weight group. However the values were not significantly different when comparison was done in between Normal weight Vs Overweight and between Overweight Vs Class-1 obesity and between Class-1 Vs Class-2 obesity.

There was no significant difference found in the mean S.HDL of different patient group.

Table 3 shows Person's correlation between BMI Vs various biochemical analytes like S. Cholesterol, S.TG and S.HDL & between BMI and S.LDL in different group patients. We did not find any significant correlation in various analytes in different groups

The study by Shamai et al. demonstrated that higher BMI was inversely associated with HDL [16] . Another similar study showed that HDL cholesterol is negatively associated with BMI level[17, 18]. Recent studies have shown that high BMI is closely related with abnormal triglycerides levels[16, 18]. But our results did not indicate the same.

V. CONCLUSION

Mean values of S.TG and S.HDL did not show significant difference when compared along the different groups.

Mean value of S.LDL was significantly different when compared between Normal and Class 2 obesity group. However, no other group had showed significant difference in this analyle.

We have also calculated the pearson correlation coefficient between BMI and various analytes. However, in none of the analytes and in none of the group we from significant linear correlation ($r^2>0.7$).

When some parameters of serum lipid profile and BMI were compared it was observed that there was significant difference between Normal-weight and Class-2 obesity. The obtained value of S. Cholesterol, S.TG, S.LDL & BMI level were found to be significantly different in Normal-weight and Class-2 obesity patient. The Class-2 obesity has relatively larger changes in Serum lipid profile and BMI. Thus the hyperlipidemic condition increases the risk of dyslipidemia and the metabolic syndromes.

Further the study should be extended including more subjects of both the genders and of various age groups to derive the broader perspective of the synario.

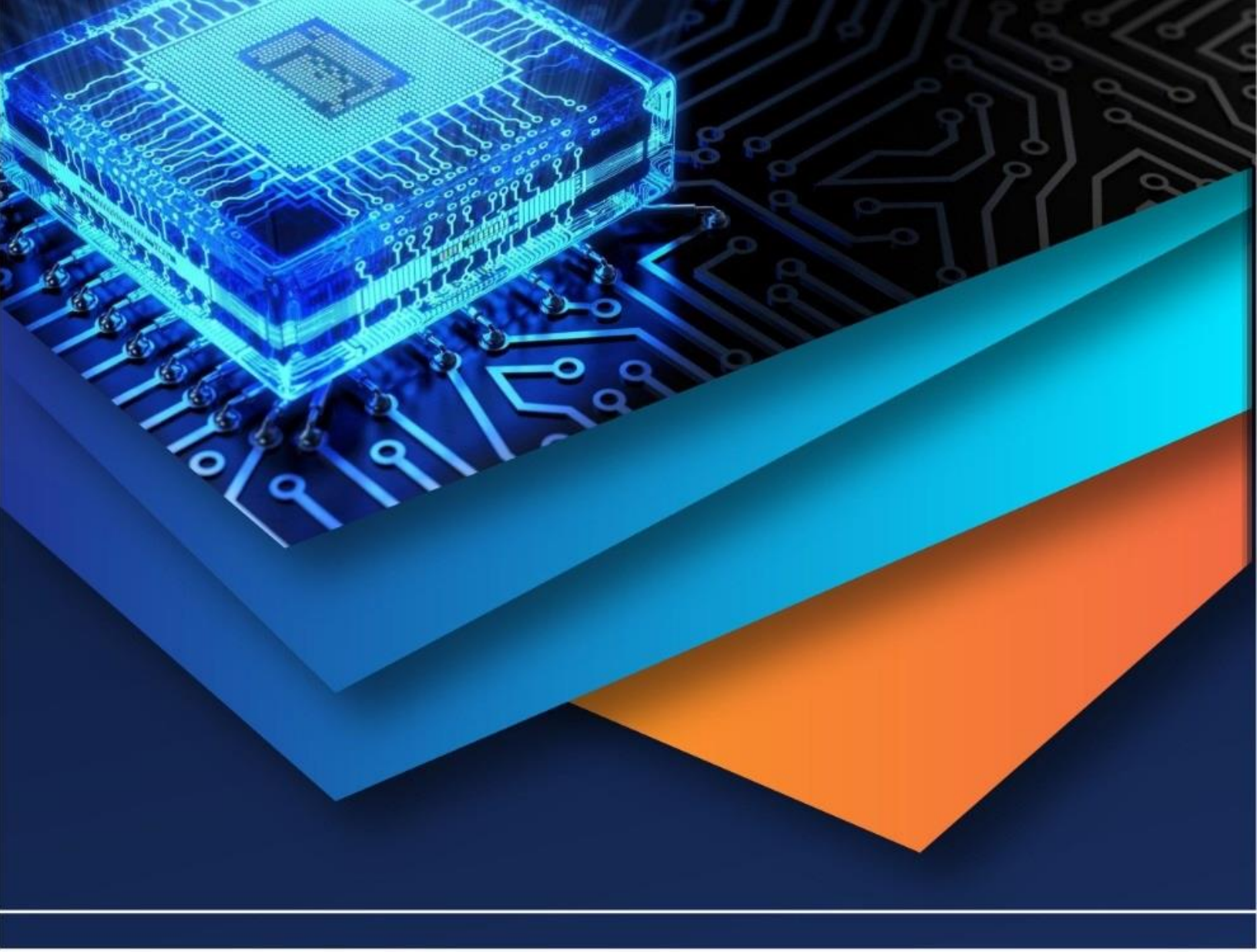
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