

Original Research Article

Comparative study of serum cholesterol level in obese and non-obese adults in peripheral institution of Jammu region

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Received: 12 February 2025

Revised: 09 March 2025

Accepted: 10 March 2025

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ABSTRACT

Background: The increasing prevalence of obesity in India has a direct correlation with the increasing prevalence of obesity related co-morbidities; hypertension, dyslipidaemia, type 2 diabetes mellitus (T2DM), stroke & cardiovascular disease (CVD). The objective of this study was to compare the Serum lipid profile of obese and non-obese patients and to focus on the frequency of dyslipidaemia in these two groups.

Methods: This was a prospective comparative study. in which 100 people were taken and further divided into 2 groups, (Group 1 was 50 obese and group 2 was 50 non-obese).

Results: On analysis of the physical characteristics of the 50 obese subjects, the mean age (years) was 43.64; the mean weight (kg) was 90.12, the mean height (cm) was 159.44; the mean BMI (kg/m²) was 35.42 while on analysis of the physical characteristics of the 50 non-obese subjects, the mean age (years) was 42.62; the mean weight (kg) was 58.2; the mean height (cm) was 158; the mean BMI (kg/m²) was 23.14. The total cholesterol was significantly higher (222 mg/dl) in obese group in comparison with the non-obese group (210 mg/dl), with p value of 0.239. Triglycerides were also significantly higher (205 mg/dl) in obese group compared to the non-obese group (146 mg/dl) with p value of <0.001. LDL was also found to be significantly higher (137.5440 mg/dl) in group 1 compared to the group 2 (113.5440 mg/dl), with a p value of p<0.001. But a significantly lower value (38.1560) was obtained in obese group compared to the non-obese group (55.0200), p<0.001 for HDL-C.

Conclusions: Obesity is associated with an increase in the incidence of coronary heart disease, congestive heart failure and strokes and also leads to increase in the values of harmful lipid like total cholesterol, TG and LDL levels. Early and immediate interventional measures like increase in physical activity, healthy dietary habits and regular surveillance are required in order to prevent development of irreversible dangerous complications.

Keywords: Cholesterol, Triglycerides, High density lipoprotein

INTRODUCTION

Obesity is increasingly recognized as a chronic multifactorial disease characterized by excessive fat accumulation which possess threat to health by excessive intake and less expenditure.¹ Obesity has reached epidemic proportions globally with significant implications for

public health as it is closely associated with various metabolic disorders.² The global rise in obesity rates is alarming with the World Health Organization (WHO) reporting in 2022, that approximately 2.5 billion (43 %) of those aged 18 years or older were classified as overweight, and 890 million (16 %) of these were living with obesity.³ In India the prevalence of overweight and obesity has surged dramatically. Data from the national family health

survey (NFHS-4) revealed that around 38.4% of men and 36.2% of women are affected reflecting significant increase of 83.7%, and 54.7% respectively.⁴ Obesity has become focal point of research due to high prevalence of obesity and its associated health risks as hypertension, dyslipidemia, type 2 diabetes mellitus (T2DM), stroke & cardiovascular disease (CVD).⁵ The relationship between obesity and serum cholesterol levels is a critical area of investigation, as fluctuations in cholesterol can lead to significant health complications.

Specifically, individuals with obesity frequently exhibit abnormal lipid profiles with higher low-density lipoprotein (LDL) and triglyceride levels, with diminished high-density lipoprotein (HDL), primarily due to increased fat storage in adipose tissue leading to increased fatty acid release, which then overwhelms the liver and causes overproduction of very-low-density lipoproteins (VLDLs), resulting in higher triglyceride levels this process is often accompanied by insulin resistance, further impairing the clearance of triglycerides from the blood.⁶

Increased levels of circulating triacylglycerol in obesity correlate with reduced concentrations of high-density lipoprotein, underpinning the heightened risk for cardiovascular disease such as heart attack in this population.⁷ As per national cholesterol education program adult treatment panel-III, Total cholesterol level below 200 mg/dl are categorized as normal while levels exceeding 240 mg/dl pose a significant risk factor for coronary heart disease.

Normal limits for LDL cholesterol are defined as below 100 mg/dl with HDL cholesterol levels above 60 mg/dl denoting a favourable lipid profile.⁸ Accordingly, the objective of the study was to compare the Serum lipid profile of obese and non-obese patients and to focus on the frequency of dyslipidaemia in these two groups.

METHODS

Study type

This was a prospective comparative study.

Study place

The study was conducted in Subdistrict Hospital Kathua, of Jammu region.

Study duration

The study was from April 2022 to March 2023.

Sample size

Sample was taken from 100 people in the age group of 18-60 years and were further divided in group 1 which consisted of obese 50 subjects and group 2 (control group) consisted of non-obese 50 subjects.

Inclusion criteria

Inclusion criteria were as following such as obesity BMI >25 kg/m², non- obesity BMI=20-24.9 kg/m² and age group 18-60 years.

Exclusion criteria

All the Patients who had Endocrine disorders like thyroid disorders and diabetes mellitus, hypertension, metabolic disorder, subjects taking oral contraceptive pills, Smokers and alcoholics were excluded from the study.

The following parameters were measured for all the study subjects i.e., anthropometric (Height and weight) and lipid profile. The body mass index was calculated based on a person height and weight by using "Quetelets Index. Blood samples were collected from the antecubital vein, in the early morning, after a minimum of 12 hours of fasting period 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.

Biochemical analysis

Serum cholesterol (TC), triglycerides (TG), serum high density lipoprotein (HDL) and serum low density lipoprotein (LDL) were measured by Enzymatic CHOD-POD method. 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. Independent sample t-test was performed to check for the statistical significance for differences in mean between the groups.

RESULTS

Following observation were made from the study of lipid profile in 50 obese and 50 non-obese subjects.

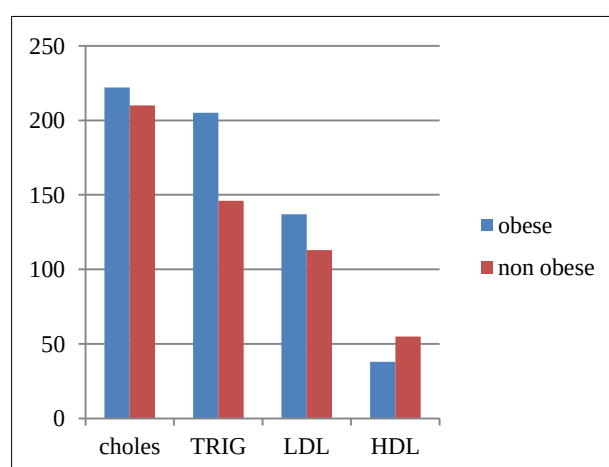


Figure 1: Comparison of different lipid parameters between obese and non-obese subjects.

Different parameters such as age, weight, height, BMI, S.Chol, S.TG, HDL, LDL of obese and non-obese are shown in Table 1. On analysis of the physical characteristics of the 50 obese subjects, the mean age (years) was 43.64; the mean weight (kg) was 90.12, the mean height (cm) was 159.44 the mean BMI (kg/m²) was 35.42 while on analysis of the physical characteristics of the 50 non-obese subjects, the mean age (years) was 42.62; the mean weight (kg) was 58.2 the mean height (cm) was 158 the mean BMI (kg/m²) was 23.14 as shown in Table 2. It was also seen that the total cholesterol was significantly higher (222

mg/dl) in obese group in comparison with the non-obese group (210 mg/dl), with p value 0.239 (Table 2). Triglycerides were also significantly higher (205 mg/dl) in obese group compared to the non-obese group (146 mg/dl) with p value of <0.001. LDL was found to be significantly higher (137.5440 mg/dl) in group 1 compared to the group 2 (113.5440 mg/dl), p<0.001 as shown in Table 2. But a significantly lower value (38.1560) was obtained in obese group compared to the non-obese group (55.0200), p<0.001 for HDL-C as shown in Table 2 and Figure 1.

Table 1: Comparison of different parameters between obese and non-obese subjects.

Parameters	N	Minimum	Maximum	Mean	Std deviation
Obese					
Age (in years)	50	26	61	43.64	9.87216
Weight (kg)	50	70	153	90.12	13.28439
Height (cm)	50	143	178	159.44	6.94926
BMI (kg/m ²)	50	30.4	55.03	35.4267	4.12454
S.Chol (mg/dl)	50	108	375	222.64	52.41855
S.TG (mg/dl)	50	98	312	205.18	56.16001
HDL (mg/dl)	50	21	58	38.156	8.97045
LDL (mg/dl)	50	110	178	137.544	14.02809
Non-obese					
Age (in years)	50	21	62	42.62	10.13358
Weight (kg)	50	46	80	58.28	7.08848
Height (cm)	50	147	191	158.74	9.06397
BMI (kg/m ²)	50	20.58	25	23.1422	1.0327
S.Chol (mg/dl)	50	169	500	210.96	45.97913
S.TG (mg/dl)	50	120	188	146.98	15.93416
HDL (mg/dl)	50	28	78	55.02	12.40061
LDL (mg/dl)	50	24	240	113.544	40.25476

Table 2: Comparison of different parameters between obese and non-obese subjects.

Parameters	Subjects	N	Mean	Std. Deviation	Significance	
					t- test	P value
Age (years)	Obese	50	43.6400	9.87216	0.510	0.611
	Non-Obese	50	42.6200	10.13358		
Weight (kg)	Obese	50	90.1200	13.28439	14.952	<0.001
	Non-Obese	50	58.2800	7.08848		
Height (cm)	Obese	50	159.4400	6.94926	0.433	0.666
	Non-Obese	50	158.7400	9.06397		
BMI (kg/m ²)	Obese	50	35.4267	4.12454	20.430	<0.001
	Non-Obese	50	23.1422	1.03270		
S.Chol (mg/dl)	Obese	50	222.6400	52.41855	1.184	0.239
	Non-Obese	50	210.9600	45.97913		
S.TG (mg/dl)	Obese	50	205.1800	56.16001	7.050	<0.001
	Non-Obese	50	146.9800	15.93416		
HDL (mg/dl)	Obese	50	38.1560	8.97045	-7.791	<0.001
	Non-Obese	50	55.0200	12.40061		
LDL (mg/dl)	Obese	50	137.7800	14.02809	-4.020	<0.001
	Non-Obese	50	113.5440	40.25476		

DISCUSSION

Obesity is a multifactor disorder and its development is due to multiple interactions between genes and environment. The primary cause for being overweight and obese is unhealthy dietary habits, reduced physical activities as well as the genetic predisposition.⁸ In this study various parameters of blood lipid profile were compared it was observed that there was significant difference between obese and non-obese subjects in relation to total cholesterol, triglycerides and high density lipoprotein which is similar to the study conducted by Goyal et al.⁹ In our study serum cholesterol was found higher in obese group as compared to non-obese which is similar to study conducted by Babu et al.¹⁰ The results of the present study showed that there are a statistically significant differences for triglycerides (TG), the results reported a significantly increased TG in obese patients as compared to non-obese which is similar to study conducted by Mohammad et al.¹¹ As for (HDL-C) there was a significant decrease in obese individuals when compared with non-obese individuals as well as the case for (LDL-C) where there was a statistically significant increase, the results recorded a significant increase when compared with non-obese individuals which is similar to study conducted by Gundy et al.¹²

The limitation of this study was that sample size was small.

CONCLUSION

Obesity is associated with an increase in the incidence of coronary heart disease, congestive heart failure and strokes and also leads to increase in the values of harmful lipid like total cholesterol, TG and LDL levels. Early and immediate interventional measures like increase in physical activity, healthy dietary habits and regular surveillance are required in them to prevent development of irreversible dangerous complications

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kaur T, Kotwal S, Kalsi P, Gadda IR. Comparative study of serum cholesterol level in obese and non-obese adults in peripheral institution of Jammu region. *Int J Res Med Sci* 2025;13:1453-6.