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Study of Serum Lipid level on Obese and Non-Obese Young Adult Subjects in Central India

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ABSTRACT
Background: Obesity is a major public health problem that results in decreased life expectancy, especially in younger age groups. Both lipid and blood sugar are found to be deranged in people who are obese for a long period of time. Obesity is a metabolic disorder and its outcome is due to multiple interactions between genes, lifestyle and the environment. This study aims at measuring and correlating values of serum cholesterol, HDL and LDL levels in obese and non-obese individuals.
Material and methods: A total number of 100 individuals of the age group between 18-29 years, coming for health check-ups at L.N. Medical College and J.K. Hospital, Bhopal were selected for the study. They were divided into groups. One group with BMI over 25 is considered an obese group, and another with a BMI less than 25 is considered a non-obese group. Fasting blood samples were analyzed for blood cholesterol, triglycerides, low-density lipoprotein (LDL) and high-density lipoprotein (HDL).
Results: A significant increase in levels of Serum Cholesterol, Triglycerides and LDL and a significant decrease in HDL in obese young adult males and females were observed. The young adult obese have relatively larger changes in serum lipids at any given level of obesity. The study has documented several lipid profile abnormalities among obese and non-obese subjects.
Conclusion: The study concluded that the presence of statistically significant changes in fat proportions is considered a risk factor for Heart, blood vessels and obesity in central India.
Keywords: Obesity, Lipid Profile, HDL, LD.

Introduction

Obesity is a major public health problem that results in decreased life expectancy, especially in younger age groups. Obesity is a metabolic disorder and its outcome is due to multiple interactions between genes, lifestyle, and the environment.[1]

The prevalence of obesity has nearly three times more between 1975 and 2016, now also prevalent in low- and middle-income countries. Obesity has huge health and economic burden and caused 2.8 million deaths (WHO, 2021) every year, 3.9% of years of life lost, and 3.8% of disability-adjusted life years (DALYs) globally.[2] With the changing lifestyle, industrialization, and digitization, there is a great shift in epidemics from infectious illnesses to lifestyle diseases. Amongst all the lifestyle disorders, obesity has emerged as one of the

most widespread disorders which itself is associated with many other lifestyle disorders such as diabetes, hypertension, coronary artery disease, chronic obstructive pulmonary disease, and cancer[3,4,5,6,7]

As per WHO projections in the year 2014, 39% of females and 38% of males and 15% of women, and 11% of men aged 18 and over were overweight and obese respectively.[8]

In the 35 member states of the Organization for Economic Co-operation and Development (OECD), more than one in two adults and nearly one in six children are overweight or obese".[9]

blood sugar is found to be deranged in people who are obese for a long period of time. Elevated blood sugar is found to be a risk factor for cardiovascular diseases and increased insulin resistance. Increased insulin resistance can lead to diabetes type-II hypertension and insulin resistance (raised fasting blood sugar level) has also been termed as a common disease called metabolic syndrome or syndrome X or insulin resistance syndrome[10,11,12,13].

Among all the population affected by obesity and overweight, it is the young adults aged 18 to 25 years who are in the most productive years of their life that in effect have a huge economic cost owing to obesity and overweight. Incidentally, while developed countries have recognized 18–25-year-olds as a 'vulnerable group' for unhealthy lifestyles leading to overweight and obesity.[14,15]

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.[16,17] Although the exact biochemical mechanisms responsible for the association between obesity and the above diseases have not been completely elucidated, it is known that an 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.[18,19]

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.[20-22]

Accordingly, the objective of the study was to compare the Serum lipid profile of obese and non-obese subjects in central India.

Aims and Objectives

Aim

To study the cholesterol, Triglycerides, HDL, and LDL levels in obese young adult subjects at L.N. medical college and J.K. Hospital, LNCT University Bhopal.

Objectives

To evaluate the effect of obesity on measuring and correlating values of serum cholesterol, Triglycerides (TG) HDL, and LDL levels as compared to non-obese.

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Material and Methods

The study was carried out in the department of Physiology, L.N. Medical College and J.K. Hospital, Bhopal. The study was conducted after taking ethical clearance from the institutional ethical committee.

Inclusion Criteria

- 50 Obese young subjects of the age group 18 to 29 years of age and
- 50 non-obese young subjects of the age group 18 to 29 years of age.

Exclusion Criteria

- Known case of diabetes
- History of drug usage such as steroids etc
- History of chronic alcohol abuse

Methodology

All the subjects fulfilling the inclusion criteria and not falling into the domain of exclusion criteria were invited to enroll in the study till the sample size requirements were fulfilled. All subjects explained the protocol of the study and written informed consent was obtained. After enrolment proper case history was recorded to confirm that the subjects selected were apparently healthy. These subjects then underwent recording the outcome of fasting and post-prandial blood sugar assessment and anthropometric parameters like height (in meters) and weight (in kilograms) and Body Mass Index (BMI) was calculated.

$$\text{BMI} = \text{Weight in kg/Height m}^2$$

The BMI was classified as per Asia Pacific Classification (WHO,2000)

CLASSIFICATION	BMI(kg/m2)
Underweight	<18.5
Normal range	18.5-22.9
overweight	>23
At risk	23-24.9
Obese I	25-29.9
Obese II	>30

Statistical Analysis

The data so collected were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) version 25. To analyse any statistically significant differences between obese and non-obese subjects. To compare the fasting lipid level of obese subjects with non-obese subjects. The confidence limit of the study was 90% hence a 'p-value less than 0.05 was considered to be statistically significant.

Result

During the period of study, young healthy volunteers (18-29 years of age) under the domain of inclusion criteria (no known history of diabetes, hypertension, respiratory disease, alcohol abuse, and steroid/drug dependence), participated in the study after obtaining their consent.

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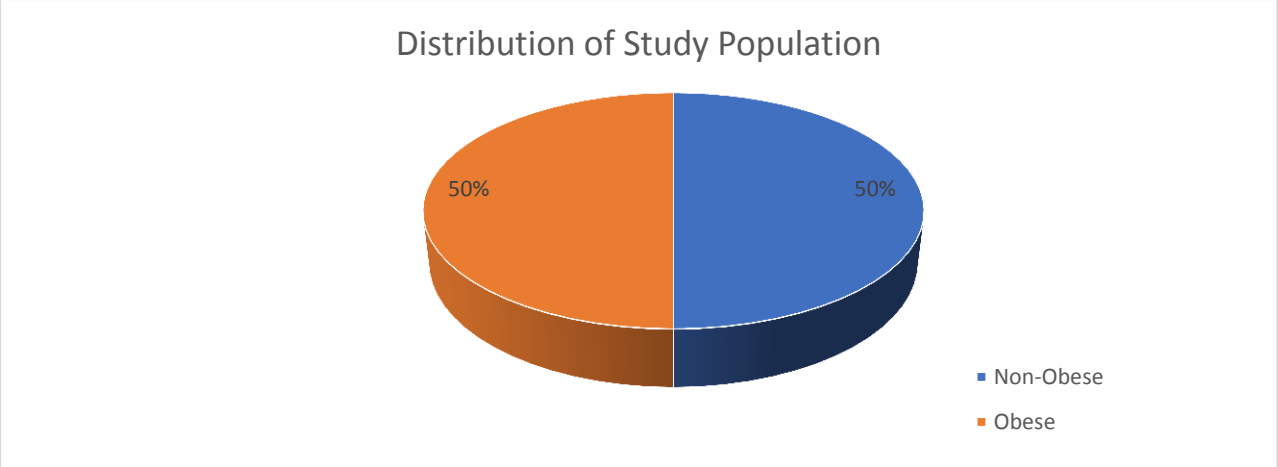
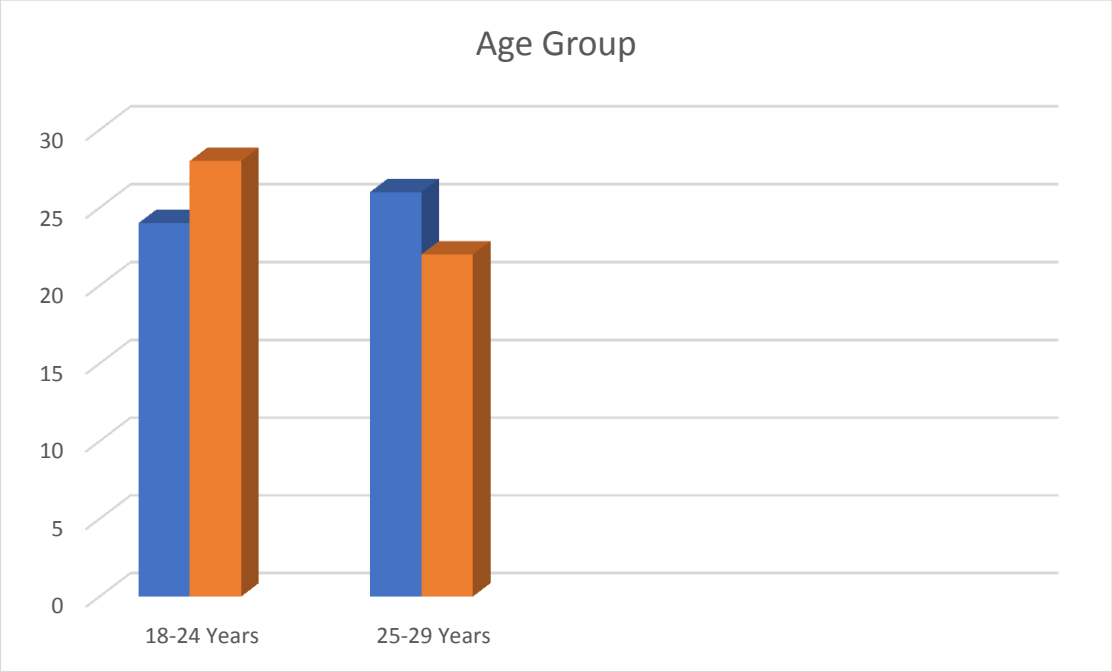
Demographic and anthropometric details of all the subjects were recorded on a separate case record form, and these subjects were subjected to laboratory investigations for lipid profiles.

Out of these subjects, 50 obese subjects (BMI >25 kg/m?) were enrolled in the study as Group I while 50 non-obese subjects (BMI <25kg/m2) were enrolled in the study as Group II.

Group	**Obesity**	**Number of Subjects**	**Percentage**
Group I	Obese (Cases)	50	50%
Group II	Non-obese (Controls)	50	50%



Age	Group I(n=50)		Group II(n=50)		Total (N=100)	
	Number	Percentage	Number	Percentage	Number	Percentage
18-24 Years	24	48.00	28	56.00	52	52.00
25-29 Years	26	52.00	22	44.00	48	48.00
	X2=2.011 (df=1), p=0.147					
Mean±SD	25.64±3.02		24.48±3.38		24.86±3.32	



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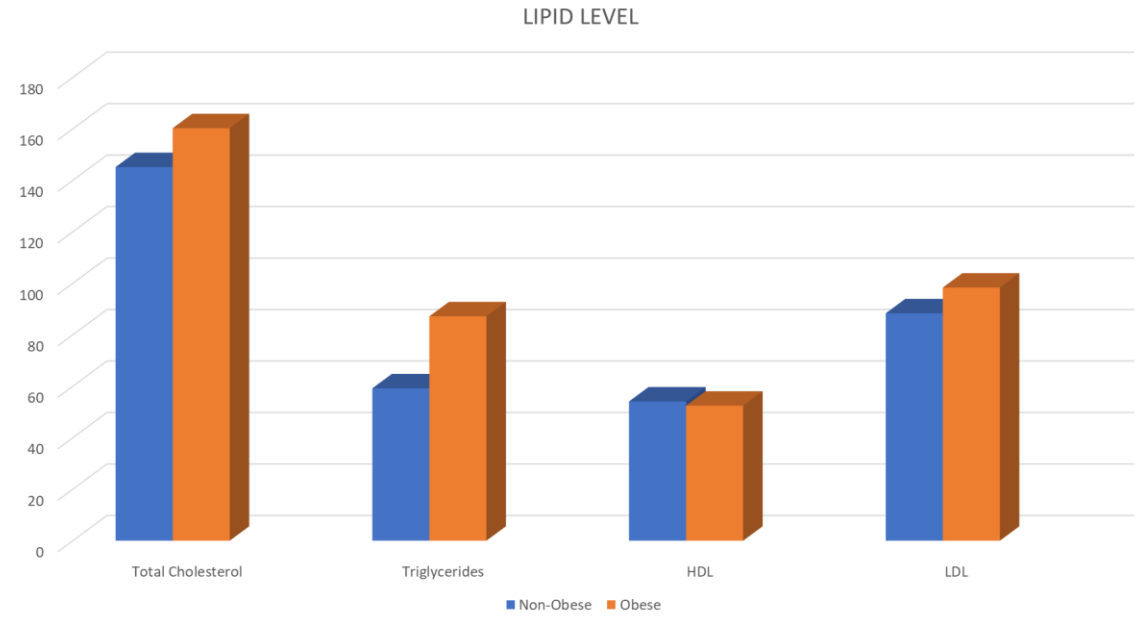
The age of study subjects ranges from 18-29 years. The mean age of group I (25.64±3.02 Years) was found to be higher as compared to group II (24.48±3.38). The proportion of subjects of group I was higher as compared to group II among the ≤age group 25-29 years (52.00% vs 44.00%), the rest of the subjects were aged ≤25 years. The difference in age of subjects of both groups was not found to be statistically significant.

Lipid Profile	Non-Obese	Obese	Test of Significance
Total Cholesterol (TC)	145.16 ± 12.10	160.24 ± 20.32	Significant p≤ 0.05
Triglycerides (TG)	59.19 ± 10.95	87.17 ±25.29	Significant p≤ 0.05
HDL	54.10 ± 7.50	52.46 ± 22.23	Non-Significant p≥ 0.05
LDL	88.34 ± 25.38	98.34±17.74	Significant p≤ 0.05



Raised levels were found among subjects of obesity as compared to non-obese for Total cholesterol (160.24 ± 20.3 vs. 145.16 ± 12.10 0 mg/dl).Triglycerides (87.17 ± 25.29 vs. 59.19 ± 10.95 mg/dl), and LDL (98.34±17.74 vs. 88.34 ± 25.38 mg/dl). These differences were found to be statistically significant. HDL levels among subjects of obese (52.46 ± 22.23 mg/dl) were found to be lower as compared to non-obese (54.10 ± 7.50 mg/dl), though this difference was not found to be statistically significant.

Discussion

The relationship between obesity and metabolism is quite evident. It has been seen that metabolic factors influence the metabolism of lipids and result in insulin resistance too. All these factors have a mutual relationship affecting each other. In view of the increasing prevalence of lifestyle-related diabetes mellitus and cardiovascular disorders among young persons and their consequent relationship with obesity, the present study was planned with the aim to study the glycemic parameters in obese young subjects at the LN Medical college Bhopal. To evaluate this, we carried out a case-control study in which a total of 100 young individuals aged 18 to 29 years were enrolled. The case group comprised 50 obese young individuals while the control group comprised of age and gender-matched 50 non-obese young individuals. In the present study, we did not find a significant difference between obese and non-obese individuals with respect to lipid levels, however, The statistical analysis of the lipid levels were generally higher in obese individuals when compared with non-obese.

Lipid levels were perhaps the most prominently affected by cardiovascular risk factors in obese young individuals. The present study found that except for HDL levels, all the lipid components (Total cholesterol, Triglyceride, Low-Density Lipoprotein,) were significantly higher in obese as compared to non-obese young individuals. Association between obesity and dyslipidemia have been reported in a number of studies, Aziz et al.[24] in their study showed a significant association of BMI with HDL and TG.

Sanlier and Yabancil [25] in their study among university students found the TG to be significantly higher in overweight students (>25 kg/m2) as compared to underweight and normal-weight students. Hashemipour et al.[26] in their study also found a significant correlation between BMI with TC, LDL, and TG.

Shamai et al.[27] on the other hand in their study observed that higher BMI was inversely associated with HDL and directly associated with TG.

In the present study too, we observed a similar correlation. none of the young individuals had metabolic syndrome.

Conclusion

This study suggested that In view of hyperlipidemia and hypercholesterolemia 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. The study concluded that the presence of statistically significant changes in fat proportions is considered a risk factor for blood vessels and obesity in central Indian young adults.

Conflict of Interest: Nil

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