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RESEARCH ARTICLE

A COMPARATIVE STUDY OF ASSOCIATION OF LIPID PROFILE WITH BODY MASS INDEX IN GENERAL POPULATION

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Abstract

Introduction: The purpose of this study was to compare blood lipid levels in healthy young males and girls accepted to a general population who fell into one of three BMI categories (underweight, normal, and overweight).

Methods: In the duration of Two months in 2022, general population of Etawah district, U.P., India.

Results: surveyed 100 (male and female) randomly selected people aged 20 to 30 years, were selected as volunteers because they were in good health. Subjects were categorised as underweight (BMI <18.5 kg/m^2), normal weight (BMI 18.5-22.9 kg/m^2), or overweight (BMI>23kg/m^2) based on their BMI values. The average levels of different types of lipids in the serum of 100 people were as, Cholesterol: 154.7±24.3 mg/dl; LDL-C: 92.6±24.7 mg/dl; VLDL: 17.8±4.9 mg/dl; Triglycerides: 81.6±22.8 mg/dl and HDL-C: 49.5 ±5.1 mg/dl. People had a mean body mass index of 21.8±4.6 5 kg/m^2 of the total study group of 100, 32 had a body mass index (BMI) below 18.5 kg/m^2; 28 had a BMI between 18.5 to 22.9 kg/m^2 and 40 were overweight. As a matter of fact, there was no link between any of the lipid profile variables and body mass index that may be statistically significant.

Conclusion: The findings of this study led us to the conclusion that obesity affects a considerable proportion of the population of young people. This prevalence may be attributable to a lack of awareness and unhealthy lifestyles; hence, health education and additional preventative measures should lower the incidence of obesity and cardiovascular risks in our society by modifying the lifestyles of people.

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Introduction:-

Obesity is becoming a major issue in India, particularly in the country's major cities [1]. Worldwide, both affluent and less developed countries are experiencing significant increases in obesity rates [2].

Roughly 30-65-75% of urban Indian adults are overweight or obese, and a similar percentage have abdominal obesity. Obesity-related conditions such as hypertension, the metabolic syndrome, dyslipidemia, type 2 diabetes mellitus (T2DM), and cardiovascular disease are on the rise alongside obesity in India (CVD) [1].

To put it simply, obesity is a condition in which there is an excessive amount of fat in the body, which has negative effects on health [1].

At 2.6% of all deaths and 2.3% of the global disease burden, obesity has surpassed tobacco use as the biggest preventable cause of death worldwide [3]. Obesity is well acknowledged as a major contributor to cardiovascular disease, glucose metabolism changes, and shorter lifespan [4].

It is widely established that lipids and lipoproteins are contributors to the development of ischemic heart disease. Atherosclerosis risk factors include elevated triglyceride, cholesterol, and low-density lipoprotein (LDL)-C levels [5].

In addition to loading macrophages with cholesterol for the generation of foam cells, oxidised or acetylated LDL-C has been identified as a significant atherogenic particle due to its chemotactic effects on circulating monocytes, cytotoxicity, and potential to adversely modify coagulation pathways [6]. Contrarily, there is an inverse correlation between the level of HDL-C in the blood and the risk of atherosclerosis and coronary heart disease; higher HDL-C levels are associated with lower risk [7].

According to the World Health Organization, BMI was determined by dividing the individual's weight in kilogrammes by their height in metres squared [8]. Obesity and high body mass index (BMI) have been documented to go hand in hand with specific lipid profiles [9]. In recent years, body mass index (BMI) has replaced other methods of measuring obesity in the medical community. This is a measure of how well person's weight corresponds with height.

Among anthropometric measurements, waist circumference has been found to be the most predictive of metabolic risk due to excess abdominal fat [10, 11]. Data on how BMI relates to lipid profile among people is scarce.

The purpose of this research was to compare the serum lipid levels of underweight, normal weight, and overweight people enrolled.

Materials And Methods:-

A total of 100 people of age 20 to 30 years from the general population of Etawah district participated in this cross-sectional study that took place over the course of two months in 2022.

Inclusion criteria:

A. They had to agree to take part in the study, and **B.** they had to be able to stand up to have their height and weight taken.

Exclusion criteria:

Previously diagnosed with Type 2 diabetes, high blood pressure, and dyslipidemia with or without treatment.

Data collection:

Methods for gathering data include taking anthropometric parameters and lipid measurements from each participant.

Anthropometric:

Weight in kg was divided by height in square metres to determine body mass index (BMI), as recommended by the World Health Organization [9, 11-12]. In order to get accurate readings, we used a height metre and a standardised scale to measure weight.

According to the Indian Reference to BMI, an overweight person has a body mass index (BMI) of >23.0, while an obese person has a BMI of 25.0 or above [13].

Laboratory Investigations:
In the morning after a fast of at least 12 hours and while lying in a supine position, blood samples were taken for laboratory analysis.

Biochemical analysis:
At the laboratory of the UPUMS, Saifai, Etawah, enzymatic methods recognised by the International Federation of Clinical Chemistry (IFCC) were used to quantify serum cholesterol, triglycerides, and high density lipoproteins (HDL) measured by Auto-Analyzer . In this case, the formula was used to determine VLDL and LDL.

Data analysis:
SPSS version 28 was used for statistical analysis. One-way analysis of variance was used to examine the statistical significance of the differences between the groups (ANOVA). A P-value less than 0.05 was chosen as the threshold for statistical significance.

Ethical Clearance:
The study was approved by the ethical committee of UPUMS, Saifai, Etawah. Before enrolling each participant in the study, we made sure they understood the study and gave their written consent. No personal information was revealed.

Results:-

The total participants of 100 people, healthy male and female from the general population participated. Subjects were categorised as underweight (BMI<18.5 kg/m^2), normal weight (BMI 18.5-22.9 kg/m^2), or overweight (BMI>23 kg/m^2) based on their BMI values. The average levels of different types of lipids in the serum of 100 people were as, Cholesterol: 154.7±24.3 mg/dl; LDL-C: 92.6±24.7 mg/dl; VLDL: 17.8±4.9 mg/dl; Triglycerides: 81.6±22.8 mg/dl and HDL-C: 49.5 ±5.1 mg/dl. People had a mean body mass index of 21.8±4.6 kg/m^2 of the total study group of 100, 32 had a body mass index (BMI) below 18.5 kg/m^2; 28 had a BMI between 18.5 to 22.9 kg/m^2 and 40 were overweight.

Table-1 displays the mean and standard deviation for blood cholesterol, LDL-C, VLDL triglycerides and HDL-C for the three BMI categories. As a matter of fact, there was no link between any of the lipid profile variables and body mass index that may be statistically significant.

Table 1:- Cholesterol, LDL-C, VLDL Triglycerides and HDL-C, according to three BMI groups (Mean ±SD).

Variables	Under weight (BMI <18.5 kg/m2)	Normal (BMI 18.5-22.9 kg/m2)	Overweight (BMI >23 kg/m2)	p-value*
Cholesterol (mg/dl)	151.7 ±21.7	154.7 ±24.3	153.8 ±21.9	0.29
LDL-C (mg/dl)	89.9 ±20.8	92.6 ±24.7	91.6 ±22.6	0.51
VLDL (mg/dl)	16.4 ±4.2	17.8 ±4.9	19.2 ±5.8	0.07
Triglycerides (mg/dl)	76.2 ±16.4	81.6 ±22.8	85.8 ±28.6	0.06
HDL-C (mg/dl)	50.8 ±4.9	49.5 ±5.1	49.9 ±4.5	0.52

Value of significance (*p-value) determined by analysis of variance (comparing means of variables across the three BMI groups). When p=0.05 or p<0.05 it is Significant.

Discussion:-

In the Serum total cholesterol, LDL-C, HDL-C, triglycerides, and very low density lipoprotein (VLDL) were all compared between the three BMI groups (underweight, normal, and overweight) in this study.

Obesity and excess body fat negatively affect cholesterol and triglyceride metabolism [14]. Excessive amounts of free fatty acids (FFA) are secreted from adipose tissue. In turn, this causes the liver to produce more TG and secrete more VLDL. Reducing HDL cholesterol is a result of hypertriglyceridemia and very low density lipoprotein, free fatty acids in the bloodstream (FFA) may play a role in triggering hypertension [15].

Some studies have found that hyperinsulinemia and insulin resistance are closely connected with obesity, which helps to explain these results [16-17].

We did not observe any statistically significant differences between the three BMI groups for total cholesterol (P=0.29), LDL-C (P=0.51), triglycerides (P=0.06), HDL-C (P=0.52) and VLDL (P=0.07) in the serum. Our study's results are in line with those of others [18-19].

It has been calculated that adults with a normal weight have a 35%-55% lower risk of myocardial infarction than adults with a high body mass index [18]. Overweight in adolescence is linked to an elevated risk of coronary heart disease in both sexes; therefore obesity's effect on cardiovascular risk can be traced back to a younger age [19].

Because of the high proportion of overweight people in our sample (40% overall), the actual number of at-risk participants is substantially larger. Consequently, efforts to reduce cardiovascular risk should focus on helping children and adolescents lose weight.

Conclusion:-

It was shown that a high prevalence of obesity is the primary factor in the development of diabetes and metabolic syndrome.

This investigation led us to the conclusion that a considerable proportion of people of age 20 to 30 years were obese. This prevalence may be attributable to a lack of awareness and unhealthy lifestyles; therefore, health education and additional preventative measures should reduce the incidence of obesity and cardiac risks in our society by adjusting the lifestyles of the people.

Our research has led us to the following recommendations for reducing the prevalence of diabetes mellitus, metabolic syndrome, and cardiovascular diseases.

Identifying people who are gaining weight, who are overweight, or who are obese is the initial stage in preventing and treating obesity through treatments.

"We urge that governments establish conditions conducive to lifestyle modifications. This will take a coordinated effort across all sectors, including health, education, sports, and agriculture, but it is the only way to reduce the prevalence of type 2 diabetes, cardiovascular diseases (CVDs) and Metabolic syndrome.

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