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Study Of Correlation Of The Lipid Patterns With Body Mass Index In Type-II Diabetics Subjects.

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ABSTRACT

The correlation between lipid patterns and Body Mass Index (BMI) in Type-II Diabetes Mellitus (T2DM) is critical, as dyslipidemia increases the risk of cardiovascular complications. Our study aimed to explore the relationship between BMI and lipid profiles in T2DM patients. A cross-sectional observational study was conducted on 40 T2DM patients at a tertiary care hospital. Patients were categorized into normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2), and obese (≥30 kg/m^2) groups based on BMI. Fasting lipid profiles, including total cholesterol, triglycerides, LDL-C, and HDL-C, were measured. Correlation analysis between BMI and lipid parameters was performed using SPSS software. Obese patients had significantly higher total cholesterol (220 ± 15 mg/dL), triglycerides (190 ± 30 mg/dL), and LDL-C (140 ± 12 mg/dL) levels compared to the normal weight group. HDL-C levels were inversely related to BMI, with obese patients showing the lowest levels (40 ± 3 mg/dL). A significant positive correlation was found between BMI and dyslipidemia prevalence, with 80% of obese patients exhibiting dyslipidemia. Higher BMI is strongly associated with adverse lipid profiles in T2DM patients, emphasizing the need for integrated weight and lipid management to reduce cardiovascular risk.
Keywords: Type-II Diabetes Mellitus, Body Mass Index, Dyslipidemia.

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INTRODUCTION

The correlation between lipid patterns and Body Mass Index (BMI) in Type-II Diabetes Mellitus (T2DM) subjects has garnered increasing attention due to the growing prevalence of obesity and metabolic disorders [1]. T2DM is characterized by insulin resistance, often associated with dyslipidemia, a key risk factor for cardiovascular complications. Dyslipidemia in diabetic patients typically manifests as elevated triglycerides, low-density lipoprotein cholesterol (LDL-C), and reduced high-density lipoprotein cholesterol (HDL-C) levels, contributing to an increased risk of atherosclerosis and coronary artery disease [2, 3].

BMI, a widely used measure of obesity, has been shown to influence lipid metabolism significantly. Higher BMI levels are often correlated with adverse lipid profiles, exacerbating the risk of cardiovascular disease in individuals with T2DM. Understanding the relationship between BMI and lipid patterns in T2DM subjects is crucial for identifying patients at high risk of developing cardiovascular complications [4]. By investigating this correlation, healthcare professionals can develop targeted interventions, such as lifestyle modifications and pharmacological treatments, to better manage lipid abnormalities and reduce cardiovascular risk in diabetic populations. Our study aims to explore the association between BMI and lipid profiles in individuals with T2DM, contributing to a broader understanding of metabolic risk factors in diabetic care [5].

METHODOLOGY

Our study was conducted as a cross-sectional observational study involving 40 subjects diagnosed with Type-II Diabetes Mellitus (T2DM). The participants were recruited from the outpatient department of a tertiary care hospital over a six-month period. The inclusion criteria were patients with T2DM aged 30-60 years, with a BMI ranging from 18.5 to 40 kg/m². Patients with severe comorbid conditions, such as chronic kidney disease, liver disease, or thyroid dysfunction, and those on lipid-lowering therapy were excluded from the study. Informed consent was obtained from all participants prior to their inclusion.

The data collection process involved a thorough clinical examination, detailed medical history, and measurement of anthropometric parameters such as height, weight, and BMI. BMI was calculated using the standard formula: weight in kilograms divided by height in meters squared (kg/m^2). The patients were categorized into groups based on their BMI: normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2), and obese (≥30 kg/m^2). Fasting blood samples were collected from all subjects to assess lipid parameters, including total cholesterol, triglycerides, LDL-C, and HDL-C.

The lipid profile of each participant was determined using an automated biochemical analyzer. The results of lipid parameters were categorized as per standard guidelines. Dyslipidemia was defined based on elevated total cholesterol, elevated triglycerides, elevated LDL-C, and reduced HDL-C levels, using the cut-off values recommended by the National Cholesterol Education Program Adult Treatment Panel (NCEP ATP III). The correlation between BMI categories and lipid parameters was analyzed statistically.

The data were entered into an electronic database and analyzed using SPSS software version 25.0. Descriptive statistics were used to summarize the demographic data, and correlation analysis was performed to evaluate the relationship between BMI and lipid patterns. A p-value of less than 0.05 was considered statistically significant. Ethical approval for the study was obtained from the Institutional Ethics Committee.

RESULTS

Table 1: Distribution of Subjects Based on BMI Categories

BMI Category (kg/m^2)	Number of Subjects (n=40)	Percentage (%)
Normal weight (18.5-24.9)	10	25%
Overweight (25-29.9)	15	37.5%
Obese (≥30)	15	37.5%

Table 2: Lipid Profile Parameters in Different BMI Categories

Lipid Parameter	Normal weight (18.5-24.9)	Overweight (25-29.9)	Obese (≥30)
Total Cholesterol (mg/dL)	180 ± 10	200 ± 12	220 ± 15
Triglycerides (mg/dL)	140 ± 20	160 ± 25	190 ± 30
LDL-C (mg/dL)	100 ± 8	120 ± 10	140 ± 12
HDL-C (mg/dL)	50 ± 5	45 ± 4	40 ± 3

Table 3: Prevalence of Dyslipidemia in Different BMI Categories

BMI Category (kg/m²)	Dyslipidemia Present (n)	Dyslipidemia Absent (n)	Percentage with Dyslipidemia (%)
Normal weight (18.5-24.9)	4	6	40%
Overweight (25-29.9)	10	5	66.7%
Obese (≥30)	12	3	80%

Table 4: Correlation Between BMI and Lipid Parameters

Lipid Parameter	Pearson Correlation Coefficient (r)	p-value
Total Cholesterol (mg/dL)	0.75	<0.001
Triglycerides (mg/dL)	0.68	<0.01
LDL-C (mg/dL)	0.72	<0.001
HDL-C (mg/dL)	-0.60	<0.01

DISCUSSION

Our present study aimed to explore the correlation between lipid patterns and Body Mass Index (BMI) in patients with Type-II Diabetes Mellitus (T2DM). Based on the results obtained, it is evident that BMI has a significant impact on lipid profiles in T2DM patients, with higher BMI levels being associated with more pronounced dyslipidemia. The findings provide insights into the importance of BMI management in diabetic patients to mitigate the risk of cardiovascular complications [6].

Correlation Between BMI and Lipid Profiles

Our study revealed a positive correlation between BMI and lipid parameters such as total cholesterol, triglycerides, and LDL-C levels, with statistical significance ($p < 0.05$). As shown in Table 2, patients in the obese category (BMI ≥30) had markedly higher levels of total cholesterol (220 ± 15 mg/dL), triglycerides (190 ± 30 mg/dL), and LDL-C (140 ± 12 mg/dL) compared to those in the normal weight (BMI 18.5-24.9) and overweight (BMI 25-29.9) categories. Additionally, HDL-C levels showed an inverse relationship with BMI, decreasing progressively from normal weight (50 ± 5 mg/dL) to obese (40 ± 3 mg/dL) patients.

These findings are consistent with existing literature indicating that individuals with a higher BMI are more likely to exhibit dyslipidemia. The relationship between obesity and dyslipidemia can be explained by the metabolic dysfunction associated with excess body fat, which promotes insulin resistance, a hallmark of T2DM. Insulin resistance in turn affects lipid metabolism by increasing free fatty acid release from adipose tissue, which stimulates hepatic synthesis of very-low-density lipoprotein (VLDL) and leads to elevated levels of triglycerides and LDL-C.

Prevalence of Dyslipidemia Across BMI Categories

Table 3 illustrates the prevalence of dyslipidemia across the BMI categories. The study found that 80% of the patients in the obese category (BMI ≥30) exhibited dyslipidemia, compared to 66.7% in the overweight category (BMI 25-29.9) and 40% in the normal weight category (BMI 18.5-24.9). This trend further emphasizes the link between higher BMI and adverse lipid profiles.

The higher prevalence of dyslipidemia in obese patients highlights the need for aggressive management of obesity in T2DM patients to reduce cardiovascular risk. Dyslipidemia is a well-established risk factor for atherosclerosis and coronary artery disease, which are among the leading causes of morbidity and mortality in diabetic patients. Obesity exacerbates insulin resistance and promotes an unfavorable lipid profile, increasing the risk of these complications [7].

Impact of HDL-C Levels and Cardiovascular Risk

One of the key findings of the study was the inverse correlation between BMI and HDL-C levels, as seen in Table 4 (Pearson correlation coefficient $r = -0.60$, $p < 0.01$). HDL-C is often referred to as "good cholesterol" due to its protective role in cardiovascular health, as it facilitates reverse cholesterol transport and exerts anti-inflammatory effects on the endothelium. Reduced HDL-C levels, as observed in overweight and obese individuals in this study, contribute to an increased risk of cardiovascular events.

Several studies have reported similar associations between reduced HDL-C levels and increased cardiovascular risk in obese individuals. In the context of T2DM, where patients are already at heightened risk of cardiovascular disease, a decrease in HDL-C further compounds this risk. Therefore, interventions aimed at improving HDL-C levels, such as weight loss, increased physical activity, and dietary modifications, are crucial in reducing the overall cardiovascular risk in diabetic patients with elevated BMI [8].

Clinical Implications

The strong correlation between higher BMI and dyslipidemia in this study underscores the need for an integrated approach to managing T2DM. While glycemic control is paramount, it is equally important to address other components of the metabolic syndrome, including obesity and dyslipidemia. Given that nearly 80% of obese patients in this study had dyslipidemia, managing weight through lifestyle modifications should be a central focus of treatment plans for T2DM patients.

The results of this study highlight the importance of early intervention to prevent the progression of dyslipidemia and cardiovascular complications in T2DM patients. For instance, intensive lifestyle interventions, including calorie restriction, regular physical activity, and behavior modification, can significantly reduce BMI and improve lipid profiles in diabetic patients. Moreover, pharmacological interventions such as statins or fibrates may be warranted in cases were lifestyle changes alone.

CONCLUSION

In conclusion, our study demonstrated a clear correlation between higher BMI and adverse lipid profiles in T2DM patients. Obesity was associated with elevated levels of total cholesterol, triglycerides, and LDL-C, along with reduced HDL-C levels, increasing the risk of cardiovascular complications.

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