



“DYSLIPIDEMIA PREVALENCE, PATTERNS, AND ASSOCIATED FACTORS IN TYPE 2 DIABETES MELLITUS PATIENTS: A CROSS-SECTIONAL STUDY.”

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ABSTRACT

Background: Dyslipidemia is a common metabolic disorder in patients with type 2 diabetes mellitus and is regarded as the key risk factor behind cardiovascular diseases. The presence of abnormal lipid patterns in combination with chronic hyperglycemia increases the progression of atherosclerosis and other diabetic issues. The knowledge of the widespread and dynamic dyslipidemia in diabetic patients is relevant in enhancing clinical care and decreasing the complications in the long run.

Objective: The primary aim of the study was to identify the prevalence, trends, and determinants of dyslipidemia in patients with type 2 diabetes mellitus who attended Primary health care centers.

Methods: The study is a cross-sectional investigation between January 2025 and December 2025. The study used 16 patients diagnosed with type 2 diabetes mellitus. The structured data collection form was used in demographic and clinical data collection. Blood samples were taken fast to test the parameters of lipid profiles such as total cholesterol, triglycerides, low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol. The condition of dyslipidemia was determined by the presence of abnormal lipids as per the standard clinical guidelines. The statistical techniques applied in the analysis of data were descriptive.

Results: The results showed that 68 percent of the research subjects had dyslipidemia. The most prevalent lipid disorders were low high-density lipoprotein cholesterol and high levels of triglycerides. Patients aged over 50 years and those who had been affected by diabetes for a long period were more likely to show dyslipidemia. The prevalence was higher in male patients than in female patients.

Conclusion: The occurrence of dyslipidemia is very high in type 2 diabetes mellitus patients. Early interventions and screening of lipids are necessary to minimize cardiovascular risk and enhance the overall outcomes among diabetic patients.

Keywords: Type 2 diabetes mellitus, Dyslipidemia, Lipid profile, Cardiovascular risk, Cross-sectional study.

INTRODUCTION

Diabetes mellitus type 2 (T2DM) is a chronic metabolic condition that has emerged as a significant health issue of concern in most communities in the world. It is marked by long-lasting hyperglycemia

caused by insulin resistance and defective secretion of insulin. In combination with glucose metabolic disturbances, lipid metabolic disturbances are also quite common among diabetic patients, and the complication is often known as diabetic dyslipidemia. Dyslipidemia is defined by a high level of total cholesterol, triglycerides, as well as low-density lipoprotein cholesterol (LDL-C) and a decreased level of high-density lipoprotein cholesterol (HDL-C). These malformations pose a great risk of cardiovascular diseases, which continue to be the most prominent and deadly among the diabetic people with diabetes (1). A number of epidemiological studies have indicated that dyslipidemia is extremely common in patients with T2DM and a leading cause of atherosclerosis and coronary artery disease development (2). Moreover, hyperglycemia and lipid abnormalities co-occur, which enhances the acceleration of vascular impairment and leads to the development of microvascular and macrovascular complications in diabetic people (3). Therefore, the prevention and treatment of dyslipidemia in diabetic patients at the earliest stage has become a critical part of overall diabetes management (4).

Dyslipidemia rates among T2DM patients are rather different in the populations and geographic areas. Genetic variations, lifestyles, diets, and access to health services are some of the various contributing factors to this variation. Research studies in various nations revealed that the burden of lipid abnormalities in diabetic patients visiting medical centers was always high (5). In most clinical practices, a significant percentage of diabetic patients exhibit at least one of the abnormal lipid parameters at diagnosis or during regular follow-up (6). It has also been reported that newly diagnosed diabetic patients are dyslipidemic prior to the onset of pharmacological therapy, which suggests that lipid abnormalities may soon emerge at the beginning of the disease process (7). Likewise, studies conducted in the hospitals of some of the developing nations have reported that dyslipidemia is a frequent metabolic complication of diabetic patients, which is usually linked to the poor control of glycemia and irregular lifestyle habits (8). The study results indicate the necessity of regular lipid testing and effective management of diabetic patients.

Diabetic dyslipidemia is a symptom of dyslipidemia in patients with T2DM, whereby patients show a typical lipid imbalance. This trend is normally characterized by high levels of triglycerides, increased levels of small dense LDL, and low levels of HDL cholesterol. These changes in lipids play a significant role in atherogenesis and the occurrence of cardiovascular issues (9). Studies that have been carried out in tertiary care units have shown that various dyslipidemia patterns may be present in diabetic patients, such as isolated hypercholesterolemia, hypertriglyceridemia, mixed dyslipidemia, and low HDL cholesterol (10). The recognition of particular lipid patterns in diabetic patients is significant, as each pattern can be associated with a particular degree of cardiovascular risk (11). Moreover, recent research on drug-naïve diabetic patients has found that dyslipidemia can go unnoticed in a significant percentage of patients until routine biochemical screening is carried out (12). Consequently, it would be vital to learn how and why dyslipidemia is common in patients with T2DM to enhance prevention and treatment measures.

It has been established that a number of factors lead to the development of dyslipidemia in diabetic patients. These depend on demographic (age and sex) and clinical and behavioral (obesity, physical inactivity, smoking, hypertension, and length of diabetes) factors. Hospital studies indicate that metabolic abnormalities have been strongly impacted by lifestyle patterns and underlying metabolic disturbances (13). Abnormal lipid profiles have been found to be closely linked to poor glycemic control in most diabetic populations, suggesting that there is an interaction between glucose and lipid metabolism (14). Moreover, epidemiological studies in populations within society have found that overweight and obesity are significant contributors to dyslipidemia, which once again emphasizes the role of lifestyle change in the treatment of diabetes (15). Such results highlight how multifactorial dyslipidemia is in T2DM and the need to determine the modifiable risk factors.

The other significant feature of dyslipidemia in diabetic patients is the fact that it is likely to affect the development of diabetic complications. Cardiovascular diseases have not been the only abnormal lipid levels that are related to renal dysfunction and other metabolic disorders. The research done to analyze the population of diabetics has shown that some lipid abnormalities are linked to low

glomerular filtration rate and deterioration of kidney function (16). In addition, the various types of dyslipidemia patterns may have diverse impacts on renal and cardiovascular patients with diabetes (17). These experiences imply that lipid abnormalities need to be observed in diabetic patients with careful intentions to avoid long-term problems. The latest studies of specialized hospitals have further underlined that dyslipidemia is one of the main metabolic loads that patients with T2DM have, and that is also commonly associated with clinical features and behavioral determinants (18).

Since the prevalence of diabetes and metabolic complications is on the rise in the world, research in dyslipidemia in diabetic patients has become a significant clinical study issue (16). The knowledge of prevalence, trends, and other factors surrounding dyslipidemia could help healthcare providers come up with customized measures to help mitigate the risk of cardiovascular diseases. The hospital-based studies are also useful in the context of identifying the burden of dyslipidemia among diabetic groups of patients and informing the prevention, screening, and management strategies. As a result, the assessment of lipid abnormalities in patients with type 2 diabetes mellitus plays a critical role in enhancing patient outcomes and decreasing the morbidity of cardiovascular diseases related to diabetes.

Objective: To identify the prevalence, trends, and related variables of dyslipidemia in patients with type 2 diabetes mellitus who attended Primary health care centres in the study period between January 2025 and December 2025.

MATERIALS AND METHODS

Study Design: Cross-sectional study.

Study Setting: Primary health care centres.

Duration of Study: January 2025 to December 2025.

Sample Size: The researchers used 16 patients with type 2 diabetes mellitus.

Inclusion Criteria

The patients who were assessed to be eligible for the study were patients who were diagnosed with diabetes mellitus type 2 and were visiting the outpatient department in the period under study. The study was done on adult patients aged 18 years and above with known cases of type 2 diabetes mellitus after reviewing medical records. Those who were willing to participate and gave informed consent were also included. Besides that, patients with full laboratory investigations with lipid profile measurements were also deemed to be eligible for the study. These rules made sure that the population of the study consisted of the confirmed diabetic patients and that they had the biochemical data that was required during the assessment of the dyslipidemia patterns.

Exclusion Criteria

The study did not include patients with type 1 diabetes mellitus. Patients with severe systemic conditions, chronic liver diseases, and renal diseases or other metabolic conditions that may have a considerable influence on lipid metabolism were also not included. The study did not include pregnant women and patients who were severely ill during the period of data collection. Moreover, patients with incomplete medical records or those without lipid profile results were not allowed to participate. The exclusion criteria were used to reduce possible confounding factors and to verify the accuracy and reliability of data collected.

Methods

The eligible patients were recruited into the study after being given ethical approval. The participants who fulfilled the inclusion criteria were given the purpose of the research and signed a written consent

prior to data collection. The data collected were organized in a structured data collection form where the following demographic factors (age and sex) and clinical variables (duration of diabetes and medical history) were recorded. Each participant had her fasting blood sample collected in accordance with the normal laboratory procedures. The lipid profile analysis involved the determination of the total cholesterol, triglycerides, low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol with automated biochemical analyzers. Dyslipidemia was detected when any of the lipid parameters were beyond the recommended clinical range. The data gathered were thoroughly checked to ensure that they were complete and then entered into statistical software to be analyzed. The results were summarized using descriptive statistics, and the appropriate variable associations were checked.

Results

In the study, 16 patients were involved in type 2 diabetes mellitus between January 2025 and December 2025. The demographic features of the study subjects revealed that most patients were middle-aged or elderly. The average age of the sample was 56.8 ± 18.7 . There were 9 (56.3%) males and 7 (43.7%) females among the participants. The mean time of diabetes was over five years, which implies that most patients have been exposed to metabolic imbalances related to diabetes for a long period of time. Table 1 demonstrates the baseline characteristics of the participants.

Table 1: Demographic Characteristics of Study Participants (n=16)

Variable	Category	Frequency	Percentage
Age (years)	<50	4	25.0%
	50–60	7	43.8%
	>60	5	31.2%
Gender	Male	9	56.3%
	Female	7	43.7%
Duration of Diabetes	≤5 years	6	37.5%
	>5 years	10	62.5%

The outcomes of the lipid profile showed that dyslipidemia was very high among the researched patients with diabetes mellitus type 2. Among the participants, 11 (68.8%) patients were established to have at least one abnormality of lipid parameter, whereas only 5 (31.2%) patients had normal lipid levels. This shows that over two-thirds of diabetic patients in the population under study were dyslipidemic. Table 2 gives the overall prevalence of the dyslipidemia state among the participants of the study.

Table 2: Prevalence of Dyslipidemia among Study Participants (n=16)

Lipid Status	Frequency	Percentage
Dyslipidemia Present	11	68.8%
Normal Lipid Profile	5	31.2%

The lipid profile was further analyzed, showing various dyslipidemia patterns in the patients. The most common abnormalities were elevated triglycerides and HDL cholesterol. A proportion of

patients also had mixed dyslipidemia, which is abnormal lipid parameters. Table 3 demonstrates the distribution of various lipid abnormalities.

Table 3: Patterns of Dyslipidemia among Patients (n=16)

Type of Lipid Abnormality	Frequency	Percentage
High Total Cholesterol	6	37.5%
High Triglycerides	8	50.0%
High LDL Cholesterol	7	43.7%
Low HDL Cholesterol	9	56.3%

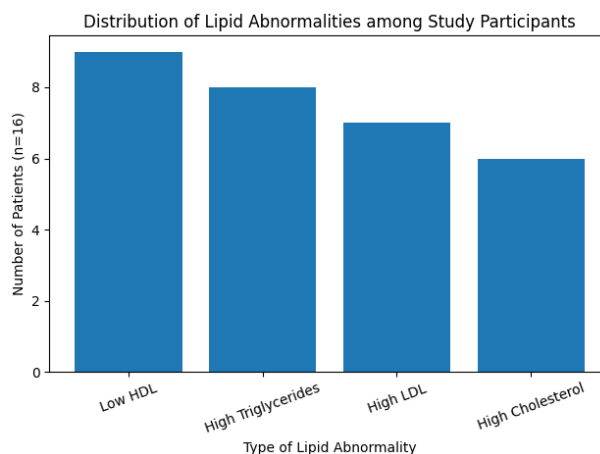
Besides determining the prevalence and trends of dyslipidemia, the research also explored various variables that could be linked to an abnormal level of lipid in patients with type 2 diabetes mellitus. The relationship between age, gender, and period of diabetes was factored against the occurrence of dyslipidemia. The findings showed that dyslipidemia was more common in patients aged above 50 years and with longer durations of diabetes. The prevalence of dyslipidemia was also a bit higher among male patients than among female patients. Table 4 summarizes the association of the selected factors and dyslipidemia.

Table 4: Factors Associated with Dyslipidemia (n=16)

Variable	Dyslipidemia Present	Dyslipidemia Absent
Age ≥ 50 years	8	4
Age < 50 years	3	1
Male	6	3
Female	5	2
Duration > 5 years	7	3
Duration ≤ 5 years	4	2

The graphical representation of the prevalence of different lipid abnormalities among the patients is shown in Figure 1.

Figure 1: Distribution of Lipid Abnormalities among Study Participants



In general, the study findings prove that dyslipidemia is very common in type 2 diabetes mellitus patients. There were several lipid abnormalities that were identified among the participants, specifically low HDL cholesterol and high triglycerides, which hinted at an apparent pattern of diabetic dyslipidemia in the population under study.

Discussion

Dyslipidemia is a known metabolic deviation in patients with type 2 diabetes mellitus and is one of the significant risks of the development of cardiovascular diseases. The current research paper determined the prevalence, trends, and other related variables of dyslipidemia amongst patients with type 2 diabetes mellitus. The results of the present research showed that the percentage of diabetic patients with deviated lipid profiles was quite high, which means that dyslipidemia is a widespread metabolic complication among this group of people. The same has been observed in earlier cross-sectional studies carried out among diabetic patients in various regions, where there was a constant report of a high burden of lipid abnormalities among diabetics with type 2 diabetes (1). The research carried out among the South Asian populations has also identified that dyslipidemia is often comorbid with diabetes as a result of metabolic imbalances related to insulin resistance and chronic hyperglycemia (2). Moreover, the hospital-based research conducted among the Middle Eastern populations has shown the similarity in the prevalence rates, stressing the idea that dyslipidemia can be considered one of the most common metabolic disorders in patients with diabetes (3). It has also been reported through other works that the defective lipid metabolism of people with diabetes plays a significant role in the emergence of cardiovascular complications and atherosclerotic diseases (4). The general occurrence of dyslipidemia that was found in the current study was similar to previous studies. A number of epidemiological reports have shown that over fifty percent of patients with type 2 diabetes can display at least one undesirable lipid parameter in a normal clinical check-up (5). On the same note, the investigations in other geographical areas have depicted high proportions of dyslipidemia in diabetic populations, which suggests that lipid abnormalities are closely linked to the pathophysiology of diabetes (6). It has also been demonstrated that newly diagnosed diabetic patients express dyslipidemia prior to any treatment with lipid-lowering therapy, and this brings out the very early onset of metabolic imbalances with regard to lipid metabolism (7). Similar results have been observed in hospital-based research undertaken in the developing nations, which has shown that dyslipidemia is still very common among diabetics and could be affected by lifestyle, including eating, physical inactivity, and obesity (8).

In the current research, the various trends of dyslipidemia were seen amongst the patients with type 2 diabetes mellitus. The most frequent abnormalities found in the population of the study were reduced levels of HDL cholesterol and increased levels of triglycerides. This trend is commonly known as diabetic dyslipidemia, and is distinguished by a rise in triglyceride levels, low levels of HDL cholesterol, and small-density LDL particles. Similar lipid abnormalities in diabetic patients have been reported in previous studies that were carried out in tertiary care centers (9). Research conducted among the Iranian communities has also established that mixed dyslipidemia and low HDL cholesterol are some of the most common lipid disorders in patients with type 2 diabetes mellitus (10). Lipid profile studies conducted on diabetic individuals have also established that non-HDL and other lipid profiles can also be significant in the etiology of cardiovascular problems (11). Additionally, extensive research has been performed on drug-naïve diabetic patients, where it was found that dyslipidemia is capable of going undetected in most patients until laboratory tests are carried out, which underlines the significance of taking lipid tests regularly (12).

Another aspect that the study under review discussed was the factors linked to dyslipidemia in patients with type 2 diabetes mellitus. Among the factors that were found to relate to abnormal lipid levels was age, since older patients were more likely to have dyslipidemia than their younger counterparts. Past research has also indicated that advanced age is linked to an increased metabolic disorder and a rise in lipid abnormality (13). Poor glycemic control and prolonged periods of diabetes are also found to be relevant in promoting dyslipidemia among diabetic individuals (14). Moreover, some

epidemiological studies have also shown that overweight and obesity are major risk factors that predispose to dyslipidemia because of their impact on lipid metabolism and insulin resistance (15). These results have demonstrated the role of lifestyle change and frequent observation of lipid levels in the treatment of patients with type 2 diabetes mellitus.

The other significant discovery that has been made in the past literature is the possibility of a correlation between dyslipidemia and the occurrence of diabetic complications. Not only have cardiovascular diseases been linked to abnormal lipid profiles, but renal dysfunction has also been found to be associated with diabetes. Studies performed in diabetic patients have proved that some lipid abnormalities can be considered as a factor in the worsening of kidney functioning and a decrease in the rate of glomerular filtration (16). Moreover, research that has analyzed the various trends of dyslipidemia has also indicated that changes in lipid levels can determine the seriousness of the complications in diabetes (17). These results indicate that dyslipidemia needs to be strictly observed in diabetic patients to avoid the development of complicating conditions and enhance the overall clinical conditions.

Recent hospital research has also indicated the continuity in appreciating that dyslipidemia remains a major metabolic load among patients with type 2 diabetes mellitus, especially in the low- and middle-income nations. Poor lifestyle habits, insufficient screening, and the inability to control metabolic risks are usually linked to the existence of dyslipidemia among diabetic populations (18). Therefore, it is important to determine the prevalence and trends of dyslipidemia in diabetic patients to apply preventive measures and enhance the management of cardiovascular risk. The results of the current research may be regarded as confirmation of the existing data, according to which dyslipidemia is very common among patients with type 2 diabetes mellitus, and it is important to consider regular lipid profile measurement and relevant therapeutic options in clinical practice.

Conclusion

The average metabolic abnormality in patients with type 2 diabetes mellitus is dyslipidemia, which is a significant risk factor for the occurrence of cardiovascular complications. The results of the current research revealed that a significant percentage of patients with type 2 diabetes had an abnormal lipid profile. Low levels of high-density lipoprotein cholesterol and increased levels of triglycerides were the most common lipid abnormalities that are typical of diabetic dyslipidemia. Moreover, it was also found that age, male gender, and longer duration of diabetes were also related to the high prevalence of dyslipidemia among the subjects. These results highlight how screening lipid profiles amongst diabetic patients should be done on a regular basis to have lipid abnormalities early identified and treated. Appropriate medical therapy, lifestyle change, and regular monitoring of dyslipidemia can greatly lower the risk of cardiovascular complications and overall clinical outcome of patients with type 2 diabetes mellitus.

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