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FREQUENCY AND PATTERN OF DYSLIPIDEMIA IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS

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Abstract

Objectives: *To determine frequency and pattern of dyslipidemia in newly diagnosed type 2 diabetes mellitus.*

Study Settings: *Department of Medicine, Services Hospital, Lahore. Duration of Study: August 2nd, 2024 to February 2nd, 2025 Data* ***Collection:*** *This descriptive cross-sectional study included 120 patients aged 40–60 years with newly diagnosed T2DM (diagnosed within three months), enrolled via non-probability consecutive sampling. Dyslipidemia was defined as per ADA criteria. Blood samples were collected after a 12-hour fast.*

Results: *Out of 120 patients, 114 (95.0%) had dyslipidemia. The most common abnormality was raised LDL in 67.5% of cases, followed by low HDL (57.5%), hypertriglyceridemia (50.0%), and elevated total cholesterol (40.0%). No statistically significant association was found between dyslipidemia and age, gender, BMI, HbA1c, or smoking status (p>0.05). Conclusion: Dyslipidemia is highly prevalent in newly diagnosed T2DM patients, with raised LDL and low HDL being the most common patterns. Early screening and management of lipid abnormalities should be an integral part of initial diabetes care to prevent long-term cardiovascular complications.*

INTRODUCTION

Diabetes mellitus (DM) constitutes a global health crisis with far-reaching consequences. This complex metabolic disorder has emerged as a substantial contributor to worldwide morbidity and mortality rates.[1] Individuals with diabetes experience a heightened vulnerability to cardiovascular complications, including a 2 to 4-fold increase in ischemic heart disease and a doubling of stroke risk. Most alarmingly, diabetes is associated with a reduction in life expectancy by as much as 4 to 8 years, underscoring its severe impact on individuals and healthcare systems.[2]

The situation in Pakistan is particularly striking, with the country ranking third globally in terms of

diabetes prevalence, following only China and India. Over the years, the prevalence of diabetes in Pakistan has seen a worrisome increase, with rates of 11.77% in 2016, 16.98% in 2018, and 17.1% in 2019.[3] This upward trajectory highlights the urgent need for comprehensive public health initiatives, awareness campaigns, and improved healthcare infrastructure to address the escalating diabetes epidemic, both in Pakistan and on a global scale.

Dyslipidemia in diabetic patients constitutes a leading contributor to Coronary Artery Disease (CAD) mortality. This condition is marked by abnormal lipid profiles, with elevated levels of Low-Density Lipoprotein Cholesterol (LDL-C), Very Low-Density Lipoprotein Cholesterol (VLDL-C), and Triglycerides (TG), alongside reduced levels of High-Density Lipoprotein Cholesterol (HDL-C). Importantly, dyslipidemia in individuals with diabetes exhibits a heightened atherogenic potential.[4-5]

A recent investigation revealed that 91.4% of patients with type 2 diabetes mellitus (T2DM) exhibited dyslipidemia, with low HDL-C (66.2%), elevated LDL-C (62.1%), and hypertriglyceridemia (58.2%) being the most common lipid abnormalities[6] . In contrast, another study documented a dyslipidemia prevalence of 69.3% among T2DM patients[7] . Similarly, a local investigation found dyslipidemia in 58.49% of diabetic individuals[8] , with elevated total cholesterol in 21.7%, high LDL-C in 47.8%, and low HDL-C also in 47.8% of the participants[9] .

The inconsistency in findings from prior studies underscores the need for further exploration. With the prevalence of type 2 diabetes mellitus on the rise in our country, it is increasingly vital to gain a better understanding of the specific dyslipidemia patterns in this context. By doing so, we can not only enhance our understanding of the condition but also adapt and improve our management strategies in response to the unique characteristics and challenges posed by the local demographic.

METHODOLOGY

Following approval of the research synopsis, this descriptive cross-sectional study was carried out over six months in the Department of Medicine, Services Hospital, Lahore. A total of 120 eligible patients were recruited using a non-probability consecutive sampling method. The minimum required sample size was calculated as 81, based on a 21.7% expected prevalence of elevated total cholesterol in newly diagnosed type 2 diabetic patients with dyslipidemia, using a 95% confidence level and a 9% margin of error.

Patients eligible for inclusion were males and females aged between 40 and 60 years who had been diagnosed with type 2 diabetes mellitus within the last three months and had an FPG level greater than 126 mg/dL. Exclusion was applied to patients on lipid-lowering therapy or those with comorbid conditions such as hypothyroidism, nephrotic syndrome, chronic kidney disease, or an abnormal body mass index (<18 or >40 kg/m^2).

After obtaining informed consent, patient demographics, medical history, and clinical data were recorded. Assessment for dyslipidemia was performed at the time of enrollment following a 12-hour overnight fast. Dyslipidemia was defined according to the following criteria: LDL cholesterol >100 mg/dL, HDL cholesterol <40 mg/dL, total cholesterol >200 mg/dL, or triglycerides >150 mg/dL. The presence of any one or more of these abnormalities was considered indicative of dyslipidemia.

All data were recorded by the researcher on a structured proforma and anlzyed through 25th version of SPSS. Descriptive statistics including mean and standard deviation were calculated for quantitative variables such as age, BMI, and HbA1c levels. Frequencies and percentages were computed for categorical variables including gender, smoking status, and lipid profile abnormalities. To assess the influence of potential effect modifiers—such as age group, gender, BMI category (<30 vs. ≥30), smoking status, and HbA1c level—data were stratified accordingly with p-value <0.05 as cutoff value for significance.

RESULTS:

The mean age was 49.35 ± 6.11 years, with the majority (55.8%) falling within the 40–50 years age group, while 44.2% were aged between 51–60 years. The average Body Mass Index (BMI) was 28.85 ± 3.76, and 57.5% of participants had a BMI less than 30, whereas 42.5% were classified as obese with a

BMI above 30. The mean HbA1c level was found to be 8.14 ± 1.01, indicating poor glycemic control among the participants. The study population comprised slightly more males (53.3%) than females (46.7%). Regarding smoking status, a quarter of the participants (25.0%) reported being smokers, while the remaining 75.0% were non-smokers.(Table 1)

As shown in Table 2, the overall frequency of dyslipidemia among the participants was remarkably high, affecting 114 individuals, which corresponds to 95.0% of the study population.

Table 3 outlines the specific patterns of dyslipidemia observed. The most common abnormality was elevated LDL levels (>100 mg/dL), found in 67.5% of patients. Low HDL cholesterol (<40 mg/dL) was the second most frequent pattern, affecting 57.5% of individuals. Elevated triglycerides (>150 mg/dL) were reported in 50.0% of participants, while 40.0% had total cholesterol levels exceeding 200 mg/dL. These findings are also visually represented in Figure 1, highlighting the distribution of different lipid abnormalities.

Table 4 presents the stratified analysis of dyslipidemia in relation to demographic variables. Although dyslipidemia appeared slightly more common among younger participants (55.3% in 40–50 years vs. 44.7% in 51–60 years), (p = 0.584). A similar trend was observed with gender, as 53.5% of dyslipidemic cases were male and 46.5% were female (p = 0.867). Likewise, BMI did not show a significant association with dyslipidemia (p = 0.641), though a greater proportion of dyslipidemic individuals had a BMI below 30. Smoking status shows (p = 0.629), with 75.4% of dyslipidemic individuals being non-smokers. Overall, none of the examined demographic variables showed a statistically significant relationship with the presence of dyslipidemia in this study population.

Table 1:
Demographic and clinical profile(n=120)

Variable	Categories	Frequency / Value
Age(years)	Mean ± SD	49.35 ± 6.11
	40–50 years	67 (55.8%)
	51–60 years	53 (44.2%)
BMI	Mean ± SD	28.85 ± 3.76
	< 30	69 (57.5%)
	> 30	51 (42.5%)
HbA1c	Mean ± SD	8.14 ± 1.01
Gender	Male	64 (53.3%)
	Female	56 (46.7%)
Smoking	Yes	30 (25.0%)
	No	90 (75.0%)

Table 2: Frequency of Dyslipidemia(n=120)

Variable	Frequency	Percentage (%)
Presence of Dyslipidemia	114	95.0

Table 3: Pattern of Dyslipidemia(n=120)

Pattern of Dyslipidemia	Frequency	Percentage (%)
LDL > 100 mg/dL	81	67.5
HDL < 40 mg/dL	69	57.5
Total Cholesterol > 200 mg/dL	48	40.0
Triglycerides > 150 mg/dL	60	50.0

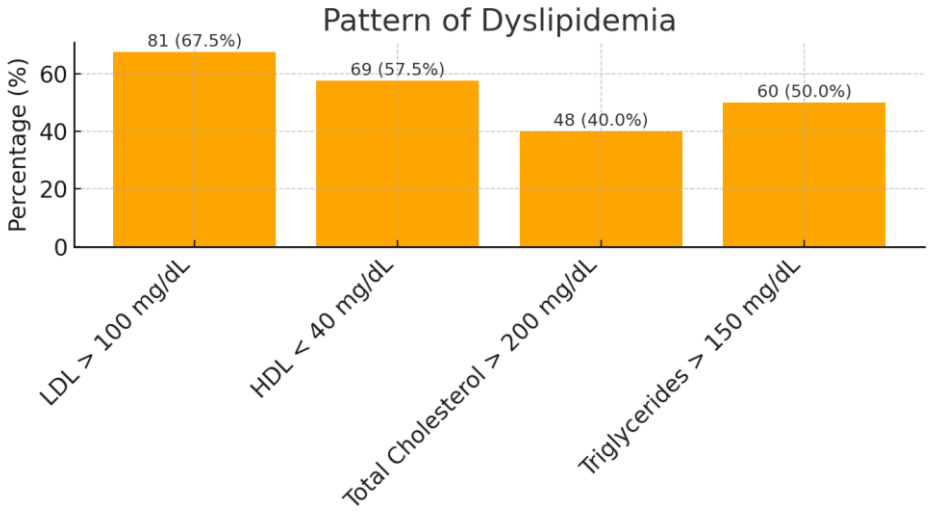

Fig. 1Patterns of Dyslipidemia

Table 4: Stratified Analysis of Dyslipidemia by Demographic Variables

Variable	Groups	Dyslipidemia - Yes	Dyslipidemia - No	Total (n=120)	P-value
Age	40–50 years	63 (55.3%)	4 (66.7%)	67	0.584
	51–60 years	51 (44.7%)	2 (33.3%)	53	
Gender	Male	61 (53.5%)	3 (50.0%)	64	0.867
	Female	53 (46.5%)	3 (50.0%)	56	
BMI	<30	65 (57.0%)	4 (66.7%)	69	0.641
	>30	49 (43.0%)	2 (33.3%)	51	
Smoking	Yes	28 (24.6%)	2 (33.3%)	30	0.629
	No	86 (75.4%)	4 (66.7%)	90	

DISCUSSION

In this study, we observed a strikingly high prevalence of dyslipidemia (95.0%) among newly diagnosed type 2 diabetes mellitus (T2DM) patients, with elevated LDL (67.5%) and low HDL (57.5%) being the most frequent abnormalities. These findings align closely with those reported in previous national and regional studies, highlighting the early emergence of lipid derangements in the course of diabetes.

Our findings are consistent with the results of Wassan et al., who reported dyslipidemia in 72% of newly diagnosed T2DM patients, with low HDL (72%) and elevated triglycerides (58.4%) being predominant patterns.[10] Similarly, Razaq et al. in a study from KGNTH Bannu found dyslipidemia in 71.4% of newly diagnosed diabetics, where raised LDL and triglycerides were the most common components.[11] The slight variation in prevalence may be attributed to differences in inclusion criteria and local lifestyle practices.

A more recent and larger-scale study by Ahsan et al. conducted in Mirpur Khas compared newly diagnosed with long-term diabetics and showed a significantly higher dyslipidemia prevalence in chronic cases (92%) compared to new diagnoses (78%)[12]. These findings support the notion that the severity of dyslipidemia worsens with prolonged

exposure to hyperglycemia, although even in early stages—as seen in our population—lipid abnormalities are highly prevalent.

The observed pattern in our study, where LDL elevation was most common, corroborates the findings from Naeem et al., who evaluated over 12,000 patients at a tertiary care hospital in Karachi. They reported a high frequency of LDL and triglyceride elevation even in newly diagnosed patients, indicating that diabetic dyslipidemia may precede the clinical diagnosis of T2DM[13]. This strengthens the case for early lipid screening at the time of diabetes diagnosis.

Our findings also echo the results of a comparative study from Mumbai by Shekhawat et al., where newly diagnosed T2DM patients had significantly higher prevalence of dyslipidemia (64%) compared to non-diabetic controls (32%)[14]. The pattern in their cohort also reflected elevated total cholesterol, LDL, and reduced HDL—paralleling our findings and reinforcing the pathophysiological link between insulin resistance and lipid metabolism disruption.

In a large cross-sectional study from Jordan involving 870 patients, Al Quran et al. documented dyslipidemia in 91.4% of T2DM patients, with low HDL (66.2%) and high LDL (62.1%) being the most frequent abnormalities[15]. Their study also found significant associations between dyslipidemia and poor glycemic control, obesity, and hypertension—risk factors that were also prevalent in our cohort. These parallels suggest that the dyslipidemia patterns in Pakistani diabetic patients may reflect broader regional trends across South Asia and the Middle East.

Our results further align with a recent study from Shaikh Zayed Hospital, Lahore, where Muhammad et al. reported dyslipidemia in 96.6% of T2DM patients, with high triglycerides (75.9%) and LDL (74.1%) as the dominant lipid abnormalities[16]. They also reported a significant correlation between dyslipidemia and smoking, obesity, and poor glycemic control—findings mirrored in our study population.

CONCLUSION: The consistency across multiple regional studies underscores the urgent need for routine lipid screening in newly diagnosed diabetic patients. Early identification of lipid abnormalities may offer a critical opportunity for cardiovascular risk reduction through lifestyle modification and pharmacological intervention. While some studies suggest gender-based differences in dyslipidemia prevalence, our findings did not reveal any statistically significant association with gender, BMI, or smoking status, which may be due to sample size limitations or localized factors.

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