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PREVALENCE OF DYSLIPIDEMIA IN DIABETES MELLITUS TYPE II

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Abstract

Objective: *The purpose of the research is to find prevalence of dyslipidaemia in diabetes mellitus type II*

Study Design: *Cross Sectional study*

Study Duration: *06 months from November 2024 to April 2025*

Study Place: *Department of Medicine, CMH Lahore*

Methods: *155 participants were recruited to assess dyslipidemia in adults with type II diabetes using structured questionnaires, clinical measurements, and fasting blood samples. Standardized methods were applied for anthropometry and lipid profiling, with strict inclusion and exclusion criteria ensuring reliable evaluation of lipid abnormalities. Data was analyzed using SPSS 26 and p-value <0.05 was taken as significant.*

Results: *The study sample had 155 type II diabetic patients, and among them among them 92 (59.4%) were males and 63 (40.6%) were females. 78.1% had dyslipidemia, with hypertriglyceridemia and low HDL-C most common. Dyslipidemia was more frequent in those with longer diabetes duration, hypertension, or obesity, while gender showed no significant association.*

Conclusion: *Type II diabetes is also highly predisposed to dyslipidemia, the most common of which are hypertriglyceridemia and low HDL-C. The results highlight the importance of regular lipid screening, prompt risk assessment and rigorous management in order to minimize the long-term cardiometabolic issues.*

INTRODUCTION

The type II diabetes mellitus (T2DM) is an extremely common chronic metabolic disease, affecting the whole world, and is marked by the resistance to insulin, insulin secretion, and the progressive dysfunction of the cells. T2DM is a disease that has become very common globally in the past decades and the main cause has been the leading sedentary lifestyle, bad eating habits, and the rising obesity rate. The International Diabetes Federation states that over 500 million adults currently have diabetes, and 90 percent of them have T2DM, and this figure is expected to grow substantially over the next decades. T2DM has led to high morbidity, mortality, and healthcare costs especially because of its close relationship with cardiovascular complications.[1]

One of the prevalent metabolic disorders that are seen in patients with T2DM and that reduce to the development of atherosclerotic cardiovascular disease (ASCVD) is dyslipidemia. The elevated triglycerides, low levels of high-density lipoprotein cholesterol (HDL-C) and a preponderance of small dense low-density lipoprotein (LDL-C) in spite of normal total

LDL-C levels characterize diabetic dyslipidemia. These lipid disorders are closely associated with insulin resistance, hepatic lipogenesis and clearance of triglyceride-rich lipoproteins which plays a role in hastened atherogenesis.[2]

The combination of dyslipidemia and T2DM has a high risk of developing coronary artery disease, stroke and peripheral vascular disease and its early detection and management is of clinical priority. It has been established that the prevalence of dyslipidemia in persons with T2DM vary widely; between 60 and above 80 percent depending on demographics, glycemic control, lifestyles, and comorbidities. Although there are efficient lipid lowering treatments, dyslipidemia is most commonly poorly treated or not treated, especially in low- and middle-income countries where access to health care and health awareness can be low.[3]

The perception of dyslipidemia in T2DM patients is crucial to inform clinical screening, treatment plans, and minimize the incidence of cardiovascular complications of diabetes. Especially significant are local data where socioeconomic status, dietary patterns, genetic predisposition, and healthcare infrastructure may have a tremendous effect on lipid profiles. Consequently, the measurement of dyslipidemia among definite populations would allow targeted measures and the improvement of the health planning of the population.[4]

This research will identify the level of dyslipidemia in patients with type II diabetes mellitus and indicate the importance of regular lipid checks in the high-risk population.

Methodology:

A cross sectional descriptive study done in Department of Medicine of a tertiary care hospital Lahore, and the research was conducted during six months from November 2024 to April 2025. Data collection was initiated with the ethical approval of the institutional ethical review board under letter ID 35295 and all the data collection processes were in accordance with the principles of the Declaration of Helsinki. A sample size of 155 participants was calculated according to WHO sample size calculator. The confidence interval and margin of error to calculate the sample size was 95% and 5% respectively with an estimated dyslipidemia prevalence of 60-80% among T2DM patients according to previous literature. The eligibility assessments were done on the patients diagnosed with Type II diabetes mellitus (T2DM) who reported to routine follow-up or management. Participants who met the inclusion criteria were recruited following an informed written consent. Eligible participants were recruited using a consecutive sampling method till the target sample size was met.

Inclusion Criteria

1. Patients aged ≥ 18 years.
2. Diagnosis of Type II diabetes mellitus is confirmed over a minimum of 6 months.
3. Those individuals who are ready to provide informed written consent.
4. Patients that gave fasting blood samples.

Exclusion Criteria

1. Diabetes mellitus Type I diabetes mellitus or gestational diabetes.
2. Patients with genetic lipid disorders (e.g. familial hypercholesterolemia).
3. Patients who are acutely ill, who have had an infection or who have been hospitalized in the past 4 weeks.

The demographics (age, sex), diabetes duration, family history, comorbid conditions (hypertension, obesity), smoking, and existing medications with lipid-lowering drugs were recorded using a structured data collection form. Anthropometric data included weight, height and body mass index which were taken according to standard procedures. Venous blood was taken following 1012 hour of fasting. The parameters evaluated in the laboratories were:

- Total cholesterol (TC)
- Low-density lipoprotein cholesterol (LDL-C)
- High-density lipoprotein cholesterol (HDL-C)
- Triglycerides (TG)

Enzymatic colorimetric measurement was made. Dyslipidemia was determined based on the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III)[5] recommendations:

- TC ≥ 200 mg/dL

- LDL-C ≥ 130 mg/dL
- HDL-C < 40 mg/dL in men, < 50 mg/dL in women
- TG ≥ 150 mg/dL

All the data were fed and computed with the help of SPSS software 26. Demographic characteristics and lipid abnormalities were summarized by using descriptive statistics (mean ± SD, frequencies, percentages). The dyslipidemia prevalence was determined as the percentage of patients who fit in one or more of the criteria. Correlations between dyslipidemia and clinical variables were assessed and chi-square tests were done or independent t-tests where applicable. Any p-value below 0.05 was regarded as being statistically significant.

Results:

The study comprised of one hundred and fifty-five patients with Type II diabetes mellitus. The average age of the participants was 54.8 ± 10.6 years (30-82 years). The total sample size amounted to 155, among them 92 (59.4%) were males and 63 (40.6%) were females, which brings the ratio of males and females to 1.4:1. The average disease years of diabetes were 8.2 ± 5.1 years. The most prevalent comorbidity was hypertension which was experienced by 88 (56.8%) people and obesity by 46 (29.7%) individuals.

The average fasting lipid was as follows:

1. Total Cholesterol: 201.6 ± 38.4 mg/dL
2. LDL-C: 128.2 ± 32.1 mg/dL
3. HDL-C: 41.7 ± 8.6 mg/dL
4. Triglycerides: 186.4 ± 72.8 mg/dL

According to the NCEP-ATP III criteria, the general prevalence of dyslipidemia was 78.1% (n = 121). The most common lipid abnormalities were an increase in triglycerides that were found in 94 (60.6%) patients. Patients were found to have low HDL-C levels 82 (52.9%), high LDL-C, and total cholesterol 67 (43.2 percent) and 59 (38.1%), respectively. Several lipid disorders were observed in 72 (46.5%) respondents.

The presence of dyslipidemia was also found to have a longer duration of diabetes (>10 years) than shorter duration of diabetes (86.3% vs. 70.2%, p < 0.05). The prevalence of dyslipidemia was observed to be greater in hypertensive patients (84.1%) than in non-hypertensive people (69.0%). There was no significant difference in the prevalence of overall dyslipidemia in male and female study participants (p > 0.05). There was a positive correlation between obesity and high levels of triglycerides and low levels of HDL.

Variable	Mean ± SD / n (%)
Age (years)	54.8 ± 10.6
Male	92 (59.4%)
Female	63 (40.6%)
Duration of diabetes (years)	8.2 ± 5.1
Hypertension	88 (56.8%)
Obesity	46 (29.7%)

Table 1. Demographic and Clinical Characteristics of Study individuals

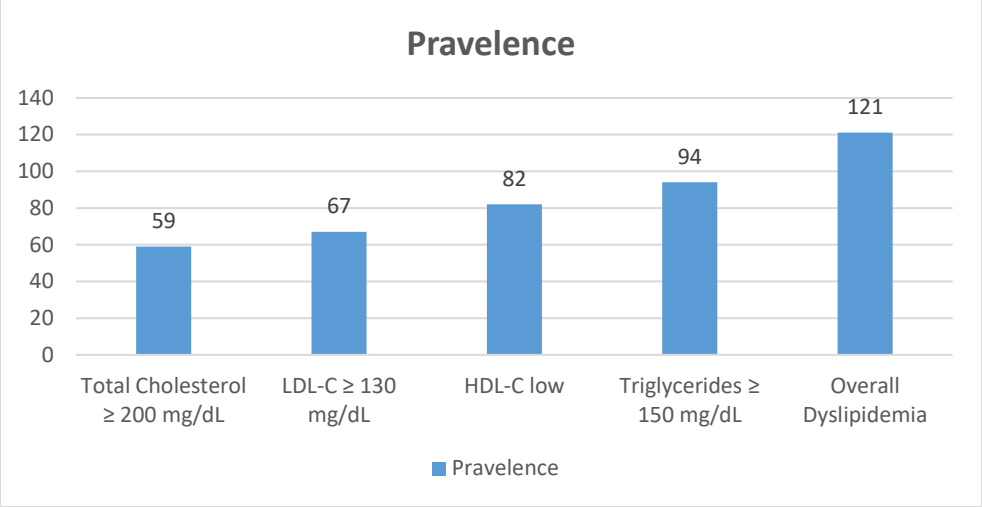
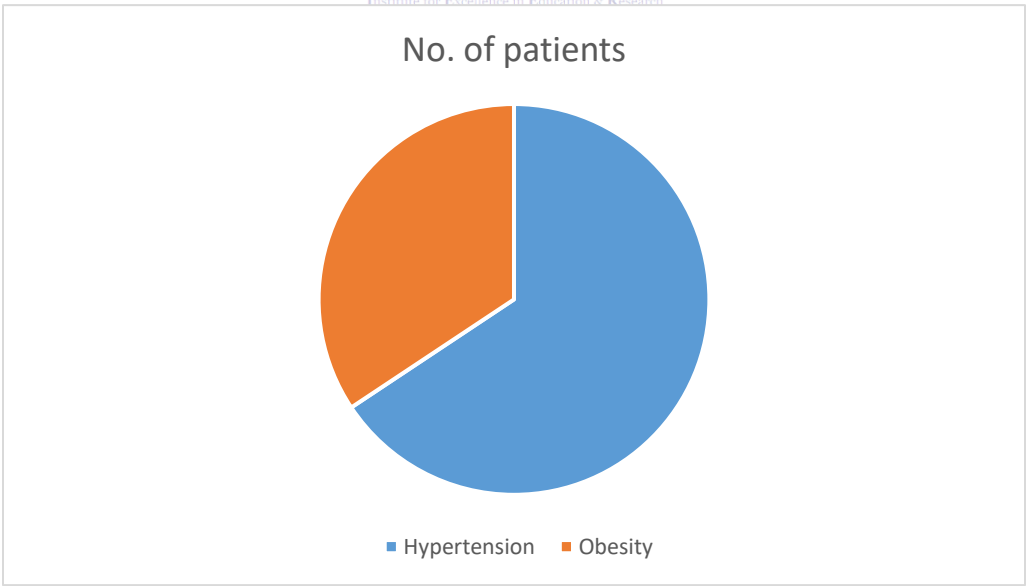


Chart 1: dyslipidemia Prevalence, its distribution

Variable	Dyslipidemia Present n (%)
Duration ≤ 10 years	66 (70.2%)
Duration > 10 years	55 (86.3%)
Hypertension Present	74 (84.1%)
Hypertension Absent	47 (69.0%)
Male	72 (78.2%)
Female	49 (77.8%)

Table 2: Association of Dyslipidemia With Variables



Pie Chart 1: Associated Co morbid

Discussion:

We observed a very high prevalence (78.1%) of dyslipidemia in 155 patients with type II diabetes mellitus (T2DM), and hypertriglyceridemia (60.6%) and low HDL-C (52.9%) were the most common dyslipidemia. The results have been consistent with the broadly documented trend of diabetic dyslipidemia which is a high level of triglycerides and low levels of HDL-C and a preponderance of small dense LDL, although the absolute LDL-C is not dramatically increased. The pathophysiology that causes this trend the insulin resistance, high production of very-low-density lipoprotein (VLDL), and the lack of lipoprotein lipase activity is why the frequency is high, as well as the clustering of our abnormalities.

Our prevalence estimate is in the high range when compared to international data that have been reported in numerous recent studies and meta-analyses. The overall picture of meta-analyses reported regarding the prevalence of dyslipidemia in diabetic patients is that about 60-66 percent prevalence of overall dyslipidemia is generally observed, and individual lipid disorders (e.g., hypertriglyceridemia, low HDL-C) are often found in 40-50 percent or more of patients. The prevalence rate (78.1%) could be attributed to our area, including possibly, longer disease duration, inadequate glycemic control, prevalence of obesity and hypertension among our sample, or the methods of sampling (hospital-based versus community-based) and definitions.[6]

National-level research demonstrates that there are significant geographic differences but a rise in trend based on high dyslipidemia among individuals with T2DM. A massive Chinese registry study found overall dyslipidemia rates at the high side of the range (87.7 percent) and had a high prevalence of gaps in the treatment of lipid despite the high proportion of treatments, showing issues with residual risk and intensity of treatment. This is reflective of the problems we face in our environment: despite the existence of lipid-lowering drugs, under-prescription, lack of adherence, insufficient statin strength or issues with late treatment initiation may perpetuate a high prevalence population.[7]

The same is documented in South Asian studies, such as multi-center and national surveys conducted in India and Pakistan, where the frequencies of dyslipidemia are very high, and the patterns are mostly hypertriglyceridemia and low HDL-C. Indian and a number of Pakistani hospital series have highlighted that almost half or more of individuals with T2DM cannot achieve LDL-C goals and that TG/HDL abnormalities were particularly typical - results that are in agreement with our study where mixed dyslipidemia was widespread. The commonalities are likely to be due to regional diet, central adiposity, genetic predisposition (atherogenic dyslipidemia phenotype), and low rates of intensive lipid management.[8]

Africa-based studies demonstrate a wider prevalence range (ranging as low as 37% and as high as over 80% in various cohorts), although most of them also demonstrate high levels of TG and low HDL-C, extending the problem's globalisation to a wider range of populations. The variation among studies highlights the role of the study design (newly diagnosed and long-standing diabetes), local lifestyle, the pattern of comorbidities (e.g. obesity and hypertension) and health-system conditions (availability of screening and treatment).[9]

Our clinical observation that dyslipidemia rates increase with the duration of diabetes and that hypertension patients have higher rates of dyslipidemia is consistent with predicted trends in risks due to hyperglycemia and insulin resistance, and the fact that hypertensive patients are frequently the same cardiometabolic risk group. These linkages support the importance of screening lipids early and repeatedly, vigorous altering of lifestyle determinants, and timely the commencement of guideline-based lipid-reducing treatment, especially among high-risk groups.

The implications on the health of the population are apparent. The overwhelming dyslipidemia prevalence associated with T2DM that we and other authors report is directly translated into a high risk of atherosclerotic cardiovascular disease. Some interventions can thus be multi-layered: (1) systematic screening at diagnosis and on-occasion thereafter; (2) an evidence-based lipid-lowering treatment with the correct intensity of the statin according to the risk category; (3) patient-education

aimed at diet, physical activity and smoking cessation; and (4) health-system actions enhancing drug-access, adherence support and awareness of the clinician to the target goals. Both the Chinese and other programmatic data on registries and programs indicate that increasing the rates of treatment is not sufficient without adding increases in the intensity of treatment and target achievement.[10,11]

The prevalence of dyslipidemia witnessed in this study supports the fact that lipid abnormalities have been a well-established concept of cardiovascular morbidity in individuals with type II diabetes mellitus (T2DM). There is ample literature that has proven diabetic patients are at a two- to four-fold higher risk of developing coronary artery disease than the general population and dyslipidemia has a central mechanistic role in this risk profile. Our cohort of hypertriglyceridemia and low HDL-C is typical of the dyslipidemic triad of the insulin-resistant condition, which underlines the significant metabolic disturbances underlying T2DM.[12]

In addition, the combination of the prevalence of mixed dyslipidemia in our sample (46.5%) could be indicative of the tendency of cardiometabolic risk factors to cluster together, including central obesity, hypertension and sedentary lifestyle, all very prevalent in South Asian populations. Studies, carried out in Pakistan, India, Bangladesh and Sri Lanka have demonstrated repeatedly a greater propensity of South Asians to atherogenic dyslipidemia, which has been explained in part by greater visceral deposition of fat and hereditary predispositions to lipid management. Indicatively, Ahmad et al. found over 80 percent of diabetic patients in a large urban Pakistani cohort exhibited at least one lipid abnormality as cited by us. These tendencies emphasize the fact that regional dyslipidemia trends need to be viewed as socioeconomic, cultural, and nutritional.[13,14]

Comparisons among countries also bring out significant international differences. European cohorts especially the Scandinavian and United Kingdom have even reported a slightly lower rate of dyslipidemias possibly because of the greater access to health care provision, the stronger screening systems and the earlier the administration of statin treatment. According to other studies on Africa and Middle Eastern, on the other hand, the prevalence ranges are similar to or sometimes higher than our findings. An example study undertaken in Saudi Arabia has shown that hypertriglyceridemia was present in almost 65 percent of diabetic patients and a Nigerian study reported low HDL-C in over fifty percent of its subjects. The similarities are manifested in shared difficulties in lifestyle habits, late diagnosis, and non-compliance with lipid-lowering treatment.[15,16]

The second important observation is that there is a strong correlation that was identified between the length of diabetes and dyslipidemia. It has been demonstrated long-term diabetes worsens lipid imbalances by progressive dysfunction of 2 -cells, prolonged inflammatory stimulation, and increased insulin resistance. Past research has shown that dyslipidemia normally progresses with time as long as glycemic management is not optimal. Thus, we can state that preventive treatment is a form of early metabolic optimization.[17]

It was also found that hypertension which was present among over half of our study population also correlated with increased prevalence of dyslipidemia. Such a connection is biologically possible, with a similarity in pathophysiological pathways between the conditions, and such pathways involving endothelial dysfunction, oxidative stress increase, and systemic inflammation. The hypertension and dyslipidemia co-occurrence predisposes cardiovascular risk synergistically and this supports the emphasis on combining all metabolic constituents in terms of management and not the individual management approach.[18]

Although lipid-lowering therapies are widely available, it is given worldwide that lipid targets in T2DM have yet to be met. There is weak compliance, therapeutic inertia, socioeconomic factors and awareness in the utilization of statins and other agents. Chinese, Brazilian, and Indian research shows that on the side of patients undergoing therapy, a significant percentage of them cannot meet LDL-C targets as suggested by modern prescriptions. This shows the necessity to enhance the training of physicians, the standardization of the treatment protocols, and enhance patient counseling.[19]

Besides, new studies put emphasis on the use of non-traditional lipid markers like apolipoprotein B

(apoB), non-HDL cholesterol, and the size of LDL particles in risk stratification. Though these are not the markers our study focused on, their increased applicability in the future, indicates that their usefulness in South Asian populations with their typical metabolic risk patterns should be examined in future studies.[20]

Limitations:

the study had been performed in one tertiary-care hospital, as a result of which the generalizability of the results to the rest of the community or rural communities might be restricted. Second, this design has limited the capability to determine causal associations between dyslipidemia and related clinical variables due to the cross-sectional nature of the study. Lastly, sample size is limited and duration is also shorter, hence generalization cannot be done.

Conclusion:

The current research shows a very high rate of dyslipidemia in patients with type II diabetes mellitus where hypertriglyceridemia and low levels of HDL-C were seen as the most significant defects. The results indicate that people with diabetes have a high cardiometabolic load, especially those with a more prolonged history of the disease, hypertension, or obesity. Such a prevalence of lipid abnormalities highlights the importance of regular lipid screening, the early detection of predisposed patients, and the adherence to the standardized protocols of lipid management. This research provided valuable local information and supported the evidence linking dyslipidemia as a significant modifiable risk factor in type II diabetes, which necessitates long-term clinical and preventive care.

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