

The Prevalence of Dyslipidemia in Patients of Newly Diagnosed Type 2 Diabetes Mellitus (T2DM) Attending Tertiary Care Hospital Federal Government Polyclinic (PGMI), Islamabad

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Abstract

Objective: Purpose of the study was to find out the prevalence of dyslipidemia in patients of newly diagnosed type 2 diabetes mellitus (T2DM) attending Federal Government Polyclinic (PGMI) Islamabad.

Study type, settings & duration: A cross sectional study was carried out at Federal Government Poly Clinic (PGMI), Islamabad from November 2022 to January 2023.

Methodology: The participants consisted of 125 individuals (60 males and 65 females) who had been recently diagnosed with type 2 diabetes mellitus. Individuals who had previously been diagnosed with diabetes or were taking lipid-lowering medication were not included in the study. The levels of blood glucose fasting, total cholesterol, triglycerides, LDL and HDL were documented by standard methods for analysis. Data was entered, cleaned and analyzed by using SPSS (Version 20.0).

Results: Of the total, 69 (55.2%) patients had hypercholesterolemia, 73 (58.4%) had hypertriglyceridemia, 63 (50.4%) had increased levels of LDL and 90 (72%) had reduced HDL. The incidence of dyslipidemia was more in female participants of diabetes mellitus as compared to male participants of diabetes mellitus.

Conclusion: This study found a high incidence of dyslipidemia among recently diagnosed patients of T2DM regardless of gender. The risk of dyslipidemia was increased by factors such as body mass index, age, waist circumference, hypertension, lack of physical activity and tobacco use. It is important to increase awareness regarding dyslipidemia and its related risk factors. Screening for dyslipidemia should be conducted early in patients with recently diagnosed type 2 diabetes mellitus, as they are more prone for developing cardiovascular diseases. It is also important to regularly monitor the lipid profile of these patients in addition to their blood glucose levels. Early intervention should be initiated once dyslipidemia is confirmed.

Key words: Diabetes mellitus, dyslipidemia, hypercholesterolemia, hypertriglyceridemia, fasting lipid profile.

Introduction

D iabetes mellitus (DM) is a long-standing health issue that arises due to an imbalance in

insulin production and its action, resulting in hyperglycemia.^{1,2} T2DM is more common than T1DM and accounts for more than 90% of all diabetic cases.³ It is estimated that 537 million adults aged between 20 to 79 years worldwide suffer from diabetes mellitus. By 2030, this number is expected to reach 643 million, and by 2045, it is expected to reach 783 million. According to the IDF Atlas 2021, there were 33 million Pakistani suffering from diabetes mellitus and this number is anticipated to rise to 62.2 million by 2045.⁴ Dyslipidemia, a condition characterized by abnormal lipid parameters due to insulin resistance or enzymes deficiency in its metabolic pathway, is prevalent among patients with T2DM.^{5,6} It is a global disease with a high prevalence of 80-90% in third-world countries such as Ethiopia,⁷ Kenya,⁸ Sri

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Authors Contribution

AIW & GK conceptualized the project and did the literature search. AAW, GK, MU, MM, TT & HA did the data collection. AAW, MM, TT & HA performed the statistical analysis. Drafting, revision & writing of manuscript were done by AAW & MM.

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Lanka.⁹ India¹⁰ and Bangladesh.^{11,12} Cardiovascular diseases contribute to almost 70-80% of deaths among patients of diabetes mellitus.^{13,14} Dyslipidemia in patients of diabetes mellitus has multiple causes, including changes in blood glucose, blood pressure, body mass index, age and unhealthy patterns of physical activity and diet.^{7,11,15-17} Rationale of the study was early detection and treatment of dyslipidemia. Diabetes as a cardiovascular risk equivalent with very high mortality and morbidity rates, leading to macrovascular complications, it would be pertinent to check lipid profile for every type 2 diabetic patient at the time of first reporting and then annually.

Methodology

A cross sectional study was carried out at FG Poly Clinic (PGMI) in Islamabad from November 2022 to January 2023.

The patients were included as ADA criteria of type 2 diabetes mellitus with the age above 20 years and below 70 years, glycosylated hemoglobin (HbA1c) >6.5%, fasting blood sugars >126 mg/dl and 2 hour Post Prandial Blood Sugars >200 mg/dl.

The patients diagnosed type 1 diabetes mellitus, gestational diabetes mellitus, age < 20 years and age > 70 years, those who were on lipid lowering agents or diuretics and diagnosed with hypothyroidism were excluded.

Data was collected using a tabulated written performa through interview. The Performa was divided into three sections, including demographic data, blood sample collection, and Body Mass Index (BMI) measurement with help of stadiometer. Venous blood samples after fasting of 10 hours were collected by medical technologists and allowed to clot briefly without the use of anticoagulant. The research assessed the results using the guideline model of the United States National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP-III).¹⁸

Prevalence tables were used to calculate the baseline characteristics of the study variables, and odds ratios (ORs) and 95% confidence intervals (CIs) were utilized to analyze independent factors such as gender, age, and BMI related to the risk of dyslipidemia. The significance level was established at a *p*-value of 0.05.

The ethical approval was obtained from the Ethical Review Committee of Federal Government Polyclinic (PGMI), Islamabad through reference number PF.1/5567/22.

Results

The results of the research are shown in Table-1. Out of the 125 patients, 73 (58.4%) had hypertriglyceridemia, 69 (55.2%) had hypercholesterolemia, 63 (50.4%) had increased levels of LDL, and 90 (72%) had reduced levels of HDL. Among the 65 female participants, 35 (54%) had hypercholesterolemia, 40 (61.6%) had hypertriglyceridemia, 35 (54%) had increased LDL levels, and 50 (77%) had reduced HDL levels. Among the 60 male participants, 34 (56.7%) had hypercholesterolemia, 35 (58.3%) had hypertriglyceridemia, 28 (46.6%) had high LDL levels, and 40 (66.7%) had reduced HDL levels. The mean age of the participants was 46.5±10.8 years, with an average fasting blood glucose level of 168±368 mg/dl. The average total cholesterol, triglyceride, LDL, and HDL levels were 204.9±40.9mg/dl, 218.70±75.8 mg/dl, 110.2±31.5 mg/dl, and 36.11±6.8 mg/dl, respectively.

Table 1: Dyslipidemia prevalence.

Characteristics	Total n (%)	Dyslipidemia n (%)
Gender		
Male	60 (48.0)	43 (71.6)
Female	65 (52.0)	51 (78.4)
Age (Years)		
30–39	35 (28)	22 (62.4)
40–49	45 (36)	33 (76.6)
50–59	30 (24)	25 (71.4)
60–70	15 (12)	14 (74.1)
Body Mass Index (BMI)		
Underweight	5 (4)	3 (60)
Normal	55 (44)	43 (78)
Overweight	50 (40)	33 (75)
Obese	15 (12)	12 (80)

The study found that every participant had dyslipidemia, as one or more of their lipid profile measurements were outside the recommended range according to the National Cholesterol Education Program guidelines. Women with type 2 diabetes had a higher occurrence of dyslipidemia compared to men. Under significantly impacted BMI and blood pressure (*p* <0.05 and *p* <0.01). Females had a higher likelihood of being overweight and obese than males, with percentages of 40% and 17% for females, and 40% and 6.6% for males, respectively. However, gender did not have a significant impact on participants' LDL, TG, HDL, and TC levels.

Table 2: Relationship between different factors and gender of the participants.

Variables	Male n (%)	Female n (%)	Total n (%)	Chi ² -value ^y	p-value [†]
<i>Age category</i>					
30 to 39 years	14 (23.4)	21 (32.3)	35 (28)	2.27	0.518
40 to 49 years	22 (36.6)	23 (35.3)	45 (36)		
50 to 59 years	15 (25)	15 (23)	30 (24)		
60 to 70 years	9 (15)	6 (9.4)	15 (12)		
<i>BMI category</i>					
Underweight	2 (3.3)	3 (4.6)	5 (4)	8.12	0.044
Normal weight	30 (50)	25 (38.4)	55 (44)		
Overweight	24 (40)	26 (40)	50 (40)		
Obese	4 (6.6)	11 (17)	15 (12)		
Yes	30 (50)	25 (38.5)	55 (44)		
<i>Level of LDL</i>					
Desirable <130mg/dL	32 (53.3)	30 (46)	62 (49.6)	1.94	0.111
Risk >130mg/ dL	28 (46.6)	35 (54)	63 (50.4)		
<i>Level of TG</i>					
Desirable <150 mg/dL	27 (45)	25 (38.4)	52 (41.6)	0.91	0.341
Risk >150 mg/dL	33 (55)	40 (61.6)	73 (58.4)		
<i>Level of HDL</i>					
Desirable >40 mg/dL	20 (33.3)	15 (23)	35 (28)	0.16	0.681
Risk <40 mg/dL	40 (67.7)	50 (77)	90 (72)		
<i>Level of TC</i>					
Normal <200 mg/dL	26 (43.3)	30 (46)	56 (44.8)	0.81	0.366
Abnormal >200 mg/dL	34 (56.7)	35 (54)	69 (55.2)		

Discussion

The incidence of dyslipidemia rising in developing countries, partly because of factors such as economic growth, a sedentary way of life, and lack of physical activity.^{11,15,16,19} This research purposed to assess the incidence of dyslipidemia and its related risk factors among individuals who were recently diagnosed with T2DM and were visiting the Endocrine department of the Federal Government Poly Clinic (PGMI) in Islamabad. The study found a high prevalence rate of dyslipidemia in both men (71.6%) and women (78.4%) participants, which is in line with previous studies carried out in different countries.^{11,15,16,19} The study also found a significant prevalence rate of raised lipid profiles including LDL (50.4%), TG (58.4%), HDL (72%), and TC (55.2%) (Table-2). The study further suggested that females with type 2 diabetes mellitus were at a higher risk of developing dyslipidemia, possibly due to their working hours and job spheres, which is also supported by similar studies.^{1,7,9} The study also found a positive correlation between advancing age and dyslipidemia.

In our study, 15 patients were obese out of which 12 (80%) had dyslipidemia similar to different studies conducted previously that demonstrated that obese individuals experience increased

lipolysis, resulting in the release of high levels of free fatty acids. This process leads to the development of hypertriglyceridemia and is also associated with increased production of very-low-density lipoprotein and triglycerides by hepatocytes. These factors can contribute to the development of cardiovascular disease and atherosclerosis in patients with type 2 diabetes mellitus.^{20,21} In addition, obesity is known to cause abnormal lipid profiles and have a significant impact on HbA1c levels due to insulin inactivity.^{22,23} Throughout the world, the occurrence of hypercholesterolemia is greater in females than males.²⁴ Dyslipidemia is becoming increasingly common in developing countries like Pakistan.²⁵

In patients with diabetes, macrovascular complications are the leading cause of morbidity and mortality worldwide. Approximately 75% die from heart or cerebrovascular disease. Likewise, the frequency of death due to cardiovascular causes in adults with diabetes is 2-4 times higher than in individuals without diabetes.

The importance of low-density lipoprotein cholesterol (LDLc) in reducing cardiovascular risk in T2DM has been demonstrated in different studies and meta-analyses.²⁶⁻²⁸ An association between dyslipidemia and cardiovascular disease (CVD) was demonstrated in the United Kingdom Prospective Diabetes Study (UKPDS: 23), which found an

increase of 38.5 mg/dl in LDLc concentration to be associated with a 157% increase in coronary artery disease, while an increase of 4mg/dl in high-density lipoprotein cholesterol (HDL) was associated with a 15% decrease in cardiovascular events.²⁹ The principal risk factor for developing coronary disease was therefore identified as LDLc, followed by HDL levels.

The results of this research, in conjunction with similar research in our area, validate that dyslipidemia is increasing in our country, making it imperative to enforce a comprehensive national public policy to manage it. Healthy public policies, education about diabetes control factors, and lifestyle interventions can mitigate the risks of dyslipidemia. To combat the ongoing increase in the prevalence of dyslipidemia among patients diagnosed with T2DM, healthcare providers should regularly perform monitoring, follow-up, and intervention programs.

In summary, this study found a high incidence of dyslipidemia among recently diagnosed patients of T2DM regardless of gender. The risk of dyslipidemia was increased by factors such as body mass index, age, waist circumference, hypertension, lack of physical activity and tobacco use. These results suggest that policies need to be put in place to improve the management of lipid profiles and to raise awareness regarding dyslipidemia among patients of diabetes mellitus. Screening for fasting lipid profiles should be conducted for newly diagnosed patients with T2DM and educational programs should be implemented to increase awareness of dyslipidemia.

Conflict of interest: None declared.

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