Frequency of Dyslipidemia in Diabetic Patients at Tertiary Healthcare Unit (Saidu Group of Teaching hospitals – SGTH), Swat, Pakistan

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Abstract

Background: Type 2 Diabetes Mellitus (T2DM) has become a global health problem. Dyslipidemia is one of the widespread metabolic complications seen in T2DM and poses critical risk involved with increased morbidity and mortality of cardiovascular disease. The abnormalities of lipid profiles include elevated triglycerides (TG), LDL, and total cholesterol (TC) and decreased levels of high-density lipoprotein (HDL). Despite these records worldwide, regional studies from under-resourced regions such as the northern region of Pakistan are few.
Objective: To determine the prevalence of dyslipidemia among patients with T2DM at the Saidu Group of Teaching Hospitals (SGTH), Swat, Pakistan. The secondary objectives include evaluating the association of dyslipidemia with demographic

factors (age and gender), glycemic control (HbA1c levels), and the duration of diabetes.

In this study, a cross-sectional study was conducted on 203 T2DM patients for six months. The data collection concerned demographic details, glycemic control (HbA1c), lipid profiles, and diabetes duration. The association of the variables of study with dyslipidemia was statistically explored using SPSS.

Results: The prevalence of dyslipidemia was 51.7%. It was most prevalent among females at 65.8% and least prevalent among males at 42.7%. In patients with less satisfactory glycemic control, where HbA1c was between 8.1% and 9.5%, the prevalence was significantly higher at 70.2%. In this study, there was no significant association found for diabetes duration and dyslipidemia.

Conclusion: Dyslipidemia among T2DM patients is a crucial comorbidity in Swat, more common in females and those with a poor glycemic control profile. This condition warrants regular screening of lipid abnormalities, lifestyle interventions associated with the possibility of better access to health care facilities to prevent cardiovascular risk in such a susceptible population. Crafting specific national guidelines for managing dyslipidemia in diabetics is well bound towards the standardization of care and prevention of its long-term implications.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder, characterized by persistent hyperglycemia due to impaired insulin secretion or deficient action of the endogenously produced hormone. Insulin controls blood glucose level; when deficient or not potent enough, it causes disturbances in metabolic processes, especially carbohydrate, fat, and protein metabolism (American Diabetes Association, 2021). Type 2 Diabetes Mellitus is the most common form of diabetes and is mainly caused by insulin resistance. In that case, cells in a human body become relatively incompetent to respond to insulin and cannot facilitate the transportation of glucose from blood into cells. The consequent poor insulin production leads over time to continuously increasing hyperglycemia (Brown & White, 2020). T2DM has been steadily on the rise globally due to sedentary lifestyle and unhealthy diet intake, obesity and aging populations (World Health Organization, 2020).

Since T2DM is continually on the rise, morbidity and mortality have drastically changed due to this disease. Cardiovascular complications account

for being the leading cause, primarily because T2DM is highly interrelated with CVDs (Smith & Lane, 2021). Among these complications, one of the major risk factors that worsens morbidity and mortality from cardiovascular disease is dyslipidemia. Dyslipidemia is abnormal lipid levels in blood, and it is now a well-established component of the metabolic syndrome observed in T2DM patients (Khan & Yousaf, 2020).

In diabetic patients, dyslipidemia often features a combination of abnormalities in lipid, including

Rising Triglycerides (TG): Extremely high levels of triglycerides - a type of fat in the bloodstream.

Heightened Low-Density Lipoproteins: Also known as "bad cholesterol", LDL is one of the facilitators that create plaque build up inside the walls of the arteries and causes atherosclerosis.

Elevation of Total Cholesterol (TC): Elevated total cholesterol level pools all types of cholesterol. This entails the LDL and HDL.

Declined HDL: In simple words, also referred to as "good cholesterol," HDL aids in removing excess cholesterol from the bloodstream and transports it to the liver to be expelled from the body (Jafar & Rehman, 2019).

These lipid alterations are significantly linked with insulin resistance, the central feature of T2DM. Alterations in lipid metabolism associated with diabetic dyslipidemia enhance atherosclerosis, namely the deposition of fatty plaques in the arterial vessels, therefore leading to a higher risk for cardiovascular events, such as myocardial infarction and stroke (Arif & Abdullah, 2020). Cardiovascular diseases are the most common cause of death among individuals with diabetes; thus, proper control of dyslipidemia is necessary to reduce the overall mortality rate (American Diabetes Association, 2021).

The prevalence of dyslipidemia among T2DM patients has been well noted globally, with reported prevalence from 45% to 73% in different populations. There is regional variance in the form of dyslipidemia, especially within the developing countries, wherein the healthcare facilities may not be up to standard. Data regarding diabetic dyslipidemia in Pakistan are very minimal and are only available for areas such as Swat in the northern part of the region. This lack of data creates difficulties for healthcare providers to understand and manage the condition, particularly in resource-constrained settings (Khan & Yousaf, 2020).

With this in mind, the purpose of the present study is to highlight a gap in the prevalence and related risk factors of dyslipidemia in T2DM patients attending a tertiary healthcare center in Swat, Pakistan. Swat is a northern region, and access to healthcare provision can hardly be achieved, although lifestyle factors like diet and physical activity represent far-from-cosmopolitan practices. Therefore, prevalence of diabetic complications, among which is

dyslipidemia, may not appear or would even go uncontrolled (Jafar & Rehman, 2019).

Main objective: To identify the prevalence of dyslipidemia in patients with T2DM at the tertiary care hospital in Swat. As determining the prevalence of dyslipidemia can be used to quantify cardiovascular risk in the patient with diabetes, it is essential to gain a perspective on how and why dyslipidemia contributes to the development of cardiovascular disease, which is the cause of most deaths in patients with T2DM (Smith & Lane, 2021). Early diagnosis and management of dyslipidemia are crucial to reduce the general burden of T2DM as well as its complications.

The study will seek to investigate demographics associated with age and gender in relation to dyslipidemia. Earlier studies had found that females, particularly post-menopausal women, are more vulnerable to developing an abnormal lipid profile because of their hormonal fluctuations and the distribution of body fat (Arif & Abdullah, 2020). On the other hand, there is also a point for age as the geriatric cohort is more susceptible to dyslipidemia by definition.

Another main objective is to study the correlation of dyslipidemia with glycemic control, which is measured through the HbA1c level. Impaired glycemic control, which is defined by elevated levels of HbA1c, is also strongly associated with lipid disturbances in T2DM patients (American Diabetes Association, 2021). This study aims to establish the validity of this correlation in the local population of Swat.

The study will determine whether the prevalence of dyslipidemia is modified by the duration of diabetes. Hyperglycemia coupled with insulin resistance often worsens metabolic complications, such as dyslipidemia (Jafar & Rehman, 2019). The linkage of diabetic duration with the presence of dyslipidemia allows clinicians to determine who among their patients are at increased risk of having cardiovascular complications. This research is conducted to further elaborate the reasons that cause dyslipidemia in patients suffering from T2DM in Swat. This knowledge will benefit to be developed into targeted interventions that improve patient outcomes and reduce the burden of cardiovascular disease in this vulnerable population.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study conducted at the Department of Medicine, Saidu Group of Teaching Hospitals, Swat, over six months from July 2020 to January 2021. The study followed a systematic approach ensuring standardized data collection and analysis.

Study Population

There were 203 T2DM patients consecutively recruited in the study using specific inclusion and exclusion criteria. Inclusion criteria included:

Participants were aged between 30 to 60 years, with confirmed T2DM diagnosis above three years.

Participants had never had any history of lipid lowering drugs.

On the other hand, exclusion criteria included;

Patients suffering from Type 1 Diabetes Mellitus. Patients having hypothyroidism, polycystic ovarian syndrome, chronic renal failure or nephrotic syndrome.

Patients with familial hypercholesterolemia or on beta blockers and thiazide diuretics.

Data Collection

The data was collected from outpatients and in-patients. A detailed history was taken, and all the participants underwent clinical examination along with laboratory investigations. The biochemical profile included:

Fasting Blood Sugar

HbA1c (to assess the glycemic control)

Lipid Profile: Total cholesterol, triglycerides, LDL, and HDL

Classification was based on accepted cut-offs for dyslipidemia: TC $\geq$ 200 mg/dl, TG $\geq$ 150 mg/dl, LDL $\geq$ 100 mg/dl, and HDL $\leq$ 40 mg/dl.

Statistical Analysis

Data analysis was carried out in SPSS version 22. Means with standard deviation $\pm$ SD and frequencies with percentages were calculated for continuous and categorical variables, respectively. Stratified analysis was done to find out the effects of demographic factors that included age and gender, HbA1c levels, and the duration of diabetes on dyslipidemia. Chi-square tests of statistical significance were performed by considering p-value $\leq$ 0.05 as a significant value.

RESULTS

The study provides an elaborate demography and a clinical profile of the diabetes patients with specific emphasis on the presence of dyslipidemia. Age distribution charts reveal that the largest proportion of the patients falls in the age group of 40–50 years, which constitutes 46.8%, whereas 27.6% of the patients fall in the age group of 50–60 and 25.6% in the age group of 30–40 years. The most common complication of diabetes is dyslipidemia. It happened more frequently among women as compared to men, showing a very highly significant gender difference in the probable occurrence of lipid abnormalities. Among the various indices of glycemic control, the highest prevalence of dyslipidemia was noted at HbA1c levels between 8.1–9.5%, which indicates a very excellent correlation of poor blood glucose control with lipid abnormalities. In those patients having HbA1c values of 6.6–8.0%, the prevalence of dyslipidemia was found to be 45.7%, and that in the patients with HbA1c above 9.5%, the prevalence of dyslipidemia was 46.7%. This again means that though the prevalence of dyslipidemia could be found at any

glycemic control level, it remained significantly high in patients with moderately elevated levels of HbA1c (8.1–9.5%).

The prevalence of dyslipidemia was highest among patients whose diabetes has been present for 10–15 years (57.9%), followed by those with a diabetes duration of 3–6 years (54.1%), and then those with diabetes for 6–10 years (46.7%). This suggests that although there is a concern over dyslipidemia across all types of durations of diabetes, it rises with a higher duration of living under diabetic conditions. Dyslipidemia tends to be more common in females and in worst glycemic control, that is, 8.1–9.5% HbA1c, and longer duration of diabetes. Regular monitoring and management of lipid status, especially for those at high risk, could prevent cardiovascular complications.

Table 1: **Comprehensive Demographic and Clinical Profile of Patients with Diabetes and Dyslipidemia at District Swat**

Age Group (Years)	Frequency	Percentage	HbA1c Range	Dyslipidemia Present	No Dyslipidemia	Duration of Diabetes (Years)	Dyslipidemia by Duration	No Dyslipidemia by Duration
30–40	52	25.60%	6.6–8.0	37 (45.7%)	44 (54.3%)	3–6	59 (54.1%)	50 (45.9%)
40–50	95	46.80%	8.1–9.5	33 (70.2%)	14 (29.8%)	6–10	35 (46.7%)	40 (53.3%)
50–60	56	27.60%	>9.5	35 (46.7%)	40 (53.3%)	10–15	11 (57.9%)	8 (42.1%)
Total				**Male: 53 (42.7%)**	**Male: 71 (57.3%)**			
				Female: 52 (65.8%)	Female: 27 (34.2%)			
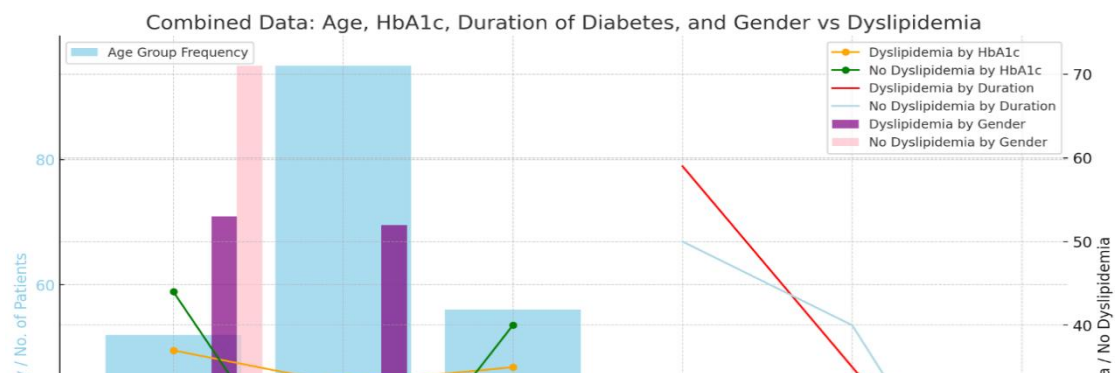
Combined Data: Age, HbA1c, Duration of Diabetes, and Gender vs Dyslipidemia

Figure 1 Relationships between various categories (age groups, HbA1c ranges, diabetes duration, and gender) and dyslipidemia

DISCUSSION

Dyslipidemia is one of the most common metabolic derangements in patients with T2DM, and significantly develops CVD. The prevalence of dyslipidemia in T2DM patients in this study was 51.7% and was in line with the prevalence findings globally and regionally. Other similar studies conducted in developed and developing countries, including Pakistan, have shown similar proportions for dyslipidemia, ranging between 45 and 73%. Other studies have asserted this reality that females have a higher incidence of dyslipidemia compared with males in study 65.8% vs. 42.7%. Therefore, it has been ascertained by various studies to have gender-related distinctions in lipid metabolism. Some prominent causes can be attributed to this fact: hormone-related fluctuations in females, distribution of body fats, and incidence of menopause, primarily among the female population, which provides a susceptible scenario for the development of adverse lipid profiles.

At this point of the study, there is a strong correlation between high HbA1c values that indicate a poor state of glycemic control with dyslipidemia. The highest prevalence of dyslipidemia was observed among the group whose HbA1c ranged from 8.1 to 9.5% (70.2%). This result does nothing but reiterate what is well documented: prolonged hyperglycemia and association with lipid disturbances in a patient with T2DM. The diabetes duration period, though usually regarded as a risk factor for complications, did not show any significant association in this study. This may be because dyslipidemia in T2DM is more directly related to the level of insulin resistance and glycemic control rather than the duration of the disorder.

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RECOMMENDATIONS

Lipid abnormalities are very common among patients suffering from T2DM. Monitoring for lipid abnormalities, therefore, should become a regular part of care, especially in women and in the case of people with poor glycemic control. For the management of dyslipidemia, lifestyle interventions, such as dietary measures and physical activity, must be in combination with pharmacological treatment.

Improvement of Primary Healthcare Services

In a resource poor area like Swat, even the primary healthcare units should be appropriately supported with more infrastructural support in order to detect early and manage the complications related to diabetes like dyslipidemia. Training of service delivery staff working in these units would also help in ensuring timely care.

Public Health Awareness Campaigns

Public health campaigns on the dangers of dyslipidemia and cardiovascular diseases concerning diabetic patients are of utmost importance in order to prompt lifestyle changes. Community health workers can engage very effectively in spreading information and promoting better living standards.

National Guidelines on Dyslipidemia in Diabetics

In addition, developing and implementing national guidelines for the management of dyslipidemia in patients with diabetes will continue to standardize care across all healthcare facilities by focusing on regular lipid screening and control of hyperglycemia.

CONCLUSION

In conclusion, it indicated that dyslipidemia is one of the most common and important complications in T2DM patients in Swat. This report specifically focusing on high prevalence, particularly in females and those patients with poor glycemic control, points toward a potential need for early detection and aggressive management of dyslipidemia in diabetic populations. Management and interventions such as patient education, lifestyle changes, and pharmacotherapy will be keys to mitigate cardiovascular risks among this most vulnerable population.

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