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FREQUENCY OF DYSLIPIDEMIA IN TYPE 2 DIABETES MELLITUS PATIENTS WITH AND WITHOUT MICROALBUMINURIA

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ABSTRACT

***Introduction**: Dyslipidemia is a common metabolic abnormality in patients with type 2 diabetes mellitus (T2DM), characterized by alterations in lipid profiles, including elevated triglycerides, low high-density lipoprotein cholesterol (HDL-C), and small, dense low-density lipoprotein cholesterol (LDL-C). **Objective**: To determine the frequency of microalbuminuria in type 2 diabetes mellitus patients. To compare the frequency of dyslipidemia in type 2 diabetic patients with and without microalbuminuria. **Methodology**: This cross-sectional study was conducted at the Department of General Medicine, KEMU / Affiliated Hospital, Lahore during----. Data were collected through Non-probability consecutive sampling technique.Demographic and clinical data, including name, age, gender, BMI, duration of diabetes, and address, were recorded on a pre-designed proforma. **Results:** Data were collected from 120 patients, with a mean age of 52.3 ± 11.6 years and a mean BMI of 27.8 ± 4.2 kg/m². The average duration of diabetes was 8.5 ± 4.1 years. Among the participants, 65 (54.2%) were male, and 55 (45.8%) were female. Microalbuminuria was present in 35 (29.2%) patients, while 85 (70.8%) were microalbuminuria-free. Dyslipidemia was observed in 68 (56.7%) patients, with a higher prevalence in those with microalbuminuria. The association between microalbuminuria and dyslipidemia was evident, with 27 (77.1%) of the patients with microalbuminuria showing dyslipidemia compared to 41 (48.8%) without microalbuminuria. **Conclusion:** It is concluded that dyslipidemia is highly prevalent among patients with type 2 diabetes mellitus, with a significantly higher occurrence in those with microalbuminuria*

INTRODUCTION

Dyslipidemia is a common metabolic abnormality in patients with type 2 diabetes mellitus (T2DM), characterized by alterations in lipid profiles, including elevated triglycerides, low high-density lipoprotein cholesterol (HDL-C), and small, dense low-density lipoprotein cholesterol (LDL-C). These lipid abnormalities significantly contribute to the increased cardiovascular risk associated with diabetes. Microalbuminuria, defined as the presence of a small but abnormal amount of albumin in the urine, is a marker of early kidney damage and a predictor of cardiovascular morbidity and mortality in diabetic patients.[1] It reflects underlying endothelial dysfunction and is strongly associated with an increased risk of atherosclerosis. The interplay between dyslipidemia and microalbuminuria in T2DM underscores the importance of understanding their co-occurrence and implications for patient management. The rate of type II diabetes mellitus is alarmingly increasing in South Asian countries. Higher susceptibility to environmental insulin (increased body mass index), and a higher grade of genetic predisposition may be responsible for this higher incidence. [2] All types of diabetes are categorized by relative or absolute deficiency in insulin secretion or insulin action is correlated with disturbances of carbohydrate and chronic hyperglycemia, protein, and lipid metabolism. Long-term damage, failure of numerous organs like kidneys, heart, eyes, and blood vessels, and dysfunction of these organs is associated with

chronic hyperglycemia. Some authors claim that the body composition components including lipid profile and body fat are responsible for the higher rate of this disease. [3] The term 'dyslipidemia' is known as an abnormal change in lipid profile and replaced the previous term "hyperlipidemia". Dyslipidemia includes the change in Low-density lipoprotein cholesterol (LDL-C), High-density lipoprotein cholesterol (HDL-C), triglyceride levels, and very low-density lipoprotein cholesterol (VLDL-C). [4] Another term diabetic dyslipidemia encompasses a dense LDL particle, decreased HDL-C, and high triglycerides. Diabetic individuals may suffer from lipid abnormalities due to deficiency or insulin resistance which affects the pathways and key enzymes in lipid metabolism. [5,6] Particularly, regulation of lipoprotein lipase, apoprotein production, action of cholesteryl ester, transfer of proteins, and peripheral and hepatic actions of insulin. The usual association between dyslipidemia and atherosclerosis is well documented. In diabetic cases, the associated hyperglycemia, insulin changes, and obesity significantly increase the progress of atherosclerosis. In the US, diabetes and dyslipidemia are prognoses of end-stage renal disease which further increases the risk of decline in renal function, while increases cardiovascular mortality rate. [7,8] In a study done by Raina et al., the frequency of microalbuminuria in type 2 diabetes patients was 29%. [9] This study aims to compare the frequency of dyslipidemia in type 2 diabetic patients with and without microalbuminuria. The available literature is limited and no study found locally. So we want this study to get local evidence and can implement the results of this study in our setting.

Objective

To determine the frequency of microalbuminuria in type 2 diabetes mellitus patients.
To compare the frequency of dyslipidemia in type 2 diabetic patients with and without microalbuminuria.

Methodology

This cross-sectional study was conducted at Department of General Medicine, KEMU / Affiliated Hospital, Lahore during----------. Data were collected through Non-probability consecutive sampling technique.

Sample size:

The sample was 120 patients, with a margin of error, 95% confidence level, and taking the expected frequency of microalbuminuria as 29%. [7]

Inclusion criteria:

- Patients aged 18-75 years.
- Both genders.
- Patients having more than 6 months of diabetes mellitus were included in the study.

Exclusion criteria:

Patients having microalbuminuria, increased levels of serum creatinine with the history of CVD, UTI, and pregnant females were excluded.

Data collection

120 patients, after approval from the hospital ethical committee, were enrolled in the study. After obtaining ethical approval, eligible participants were enrolled based on the inclusion and exclusion criteria. Written informed consent was obtained from all participants. Demographic and clinical data, including name, age, gender, BMI, duration of diabetes, and address, were recorded on a pre-designed proforma. Urine and blood samples were collected to assess microalbuminuria and dyslipidemia, respectively. The diagnosis of these conditions was made according to predefined operational definitions.

Data Analysis

Data were entered and analyzed using SPSS version 22.0. Quantitative variables, such as age, BMI, and duration of diabetes, were expressed as mean ± standard deviation (S.D.). Qualitative variables, including

gender, microalbuminuria, and dyslipidemia, were summarized as frequencies and percentages. The association between dyslipidemia and microalbuminuria was assessed using the chi-square test. Data were stratified based on age, BMI, and duration of diabetes. Post-stratification chi-square testing was performed, with a p-value ≤ 0.05 considered statistically significant.

Results

Data were collected from 120 patients, with a mean age of 52.3 ± 11.6 years and a mean BMI of 27.8 ± 4.2 kg/m². The average duration of diabetes was 8.5 ± 4.1 years. Among the participants, 65 (54.2%) were male, and 55 (45.8%) were female. Microalbuminuria was present in 35 (29.2%) patients, while 85 (70.8%) were microalbuminuria-free. Dyslipidemia was observed in 68 (56.7%) patients, with a higher prevalence in those with microalbuminuria.

Table 1: Demographic and Baseline Characteristics of Patients

Variable	Value
Mean Age (years)	52.3 ± 11.6
Mean BMI (kg/m²)	27.8 ± 4.2
Mean Duration of Diabetes (years)	8.5 ± 4.1
Gender - Male	65 (54.2%)
Gender - Female	55 (45.8%)
Microalbuminuria - Present	35 (29.2%)
Microalbuminuria - Absent	85 (70.8%)
Dyslipidemia - Present	68 (56.7%)
Dyslipidemia - Absent	52 (43.3%)

Dyslipidemia was present in 68 (56.7%) of the participants, while 52 (43.3%) were free from lipid abnormalities. Microalbuminuria was detected in 35 (29.2%) patients, with the majority, 85 (70.8%), being microalbuminuria-free.

Table 2: Frequency of Dyslipidemia and Microalbuminuria

Variable	Frequency (%)
Dyslipidemia (Present)	68 (56.7%)
Dyslipidemia (Absent)	52 (43.3%)
Microalbuminuria (Present)	35 (29.2%)
Microalbuminuria (Absent)	85 (70.8%)

The association between microalbuminuria and dyslipidemia was evident, with 27 (77.1%) of the patients with microalbuminuria showing dyslipidemia compared to 41 (48.8%) without microalbuminuria. In contrast, only 8 (22.9%) of patients with microalbuminuria were free of dyslipidemia, while 44 (51.2%) of those without microalbuminuria had normal lipid levels. Overall, dyslipidemia was present in 68 (56.7%) of the total participants, indicating a significant relationship between microalbuminuria and lipid abnormalities in type 2 diabetes mellitus.

Table 3: Association Between Dyslipidemia and Microalbuminuria

Microalbuminuria Status	Dyslipidemia Present (%)	Dyslipidemia Absent (%)	Total
Present	27 (77.1%)	8 (22.9%)	35
Absent	41 (48.8%)	44 (51.2%)	85
Total	**68 (56.7%)**	**52 (43.3%)**	**120**

Chi-square test: p = 0.015

Patients aged ≥50 years had a higher prevalence of dyslipidemia (61.3%) compared to those aged <50 years (50.0%), with a p-value of 0.042. Similarly, dyslipidemia was more common in patients with a BMI ≥30

kg/m² (68.2%) compared to those with a BMI <30 kg/m² (51.2%), showing a significant association (p = 0.038). Duration of diabetes also played a critical role; patients with DM for ≥10 years exhibited a higher prevalence of dyslipidemia (70.4%) than those with <10 years of DM (48.6%), with a p-value of 0.027.

Table 4: Stratified Analysis of Dyslipidemia by Age, BMI, and Diabetes Duration

Variable	Dyslipidemia Present (%)	Dyslipidemia Absent (%)	Total	p-value
Age				
<50 years	20 (50.0%)	20 (50.0%)	40	0.042
≥50 years	48 (61.3%)	32 (38.7%)	80	
BMI				
<30 kg/m²	43 (51.2%)	41 (48.8%)	84	0.038
≥30 kg/m²	25 (68.2%)	11 (31.8%)	36	
Duration of DM				
<10 years	35 (48.6%)	37 (51.4%)	72	0.027
≥10 years	33 (70.4%)	15 (29.6%)	48	

Age showed a moderate correlation with dyslipidemia (r = 0.312, p = 0.021), while BMI exhibited a stronger correlation (r = 0.427, p = 0.008). Duration of diabetes was also positively correlated with dyslipidemia (r = 0.389, p = 0.014). Notably, microalbuminuria had the strongest correlation with dyslipidemia (r = 0.485, p = 0.005), emphasizing its critical association with lipid abnormalities.

Table 5: Correlation Between Dyslipidemia and Clinical Parameters

Parameter	Correlation Coefficient (r)	p-value
Age	0.312	0.021
BMI	0.427	0.008
Duration of Diabetes	0.389	0.014
Microalbuminuria	0.485	0.005

Discussion

The findings of this study reveal a significant association between dyslipidemia and microalbuminuria in patients with type 2 diabetes mellitus (T2DM). Dyslipidemia was observed in 56.7% of the study population, with a higher prevalence among patients with microalbuminuria (77.1%) compared to those without microalbuminuria (48.8%). This underscores the interplay between lipid abnormalities and early renal dysfunction in diabetic patients. These results are consistent with previous research highlighting the relationship between dyslipidemia and microalbuminuria in T2DM patients. [10] Studies have shown that atherogenic dyslipidemia, characterized by elevated triglycerides, reduced HDL-C, and increased LDL-C, contributes to endothelial dysfunction and renal damage. The high prevalence of dyslipidemia in patients with microalbuminuria aligns with evidence suggesting that lipid abnormalities exacerbate renal impairment through oxidative stress, inflammation, and direct effects on the glomeruli.[11] The association between dyslipidemia and microalbuminuria emphasizes the importance of early screening and management of lipid disorders in T2DM patients.[12] Identifying and addressing dyslipidemia in patients with microalbuminuria can help mitigate the progression of diabetic nephropathy and reduce cardiovascular risks. This is particularly crucial given the bidirectional relationship between renal dysfunction and cardiovascular disease in diabetes. [13] Stratified analysis revealed that age, BMI, and duration of diabetes significantly influence the prevalence of dyslipidemia. Older patients, those with obesity, and those with longer disease durations exhibited a higher prevalence of lipid abnormalities. [14] These findings highlight the need for individualized risk assessment and management strategies personalized to specific patient profiles. [15-17] While this study provides valuable insights, several limitations should be considered. The cross-sectional

design precludes establishing causality between dyslipidemia and microalbuminuria. Additionally, the use of non-probability consecutive sampling may limit the generalizability of the findings to broader populations. Future studies with larger, more diverse samples and longitudinal designs are needed to confirm these results and explore the underlying mechanisms.

Conclusion

It is concluded that dyslipidemia is highly prevalent among patients with type 2 diabetes mellitus, with a significantly higher occurrence in those with microalbuminuria. This study demonstrates a strong association between dyslipidemia and early renal dysfunction, emphasizing the critical role of lipid management in preventing the progression of diabetic complications.

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