

PREVALENCE OF DYSLIPIDEMIA IN CHRONIC KIDNEY DISEASE PATIENTS

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Abstract**Author Details**

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Background: Dyslipidemia is common in chronic kidney disease (CKD) and contributes to the high cardiovascular risk observed in this population. The pattern may differ from that seen in the general population, with triglyceride-rich lipoproteins and reduced high-density lipoprotein cholesterol frequently predominating.

Objective: To determine the frequency and pattern of dyslipidemia among adults with CKD presenting to a tertiary-care medical centre.

Methodology: This descriptive cross-sectional sample manuscript uses dataset representing 125 consecutive adults with CKD stages 3-5 who attended the medical outpatient department or were admitted to Islamabad Medical Complex (NESCOM), Islamabad, from January 2025 to June 2025. A fasting lipid profile was recorded, and dyslipidemia was defined as the presence of at least one abnormal lipid parameter.

Results: Dyslipidemia was observed in 89 of 125 patients (71.2%). Hypertriglyceridemia was the most frequent abnormality (57.6%), followed by low HDL-C (52.0%), high LDL-C (40.0%), and raised total cholesterol (32.8%). The frequency increased from 59.0% in stage 3 to 77.1% in stage 4 and 76.3% in stage 5 CKD.

Conclusion: Dyslipidemia was frequent in this CKD cohort, particularly among patients with more advanced disease. Lipid assessment should form part of cardiovascular-risk evaluation in CKD.

Introduction

Chronic kidney disease is a persistent abnormality of kidney structure or function with implications for health. Declining glomerular filtration rate is associated with a rising burden of cardiovascular disease, hospitalisation, and mortality. CKD therefore requires attention not only to renal replacement planning but also to modifiable cardiovascular risk factors.^{1,2}

Lipid disturbances are common in CKD. Reduced clearance of triglyceride-rich particles, altered activity of lipoprotein lipase and hepatic lipase, inflammation, insulin resistance, proteinuria, and changes in apolipoprotein metabolism may all contribute. The characteristic pattern is often hypertriglyceridemia with low HDL-C and qualitative changes in LDL particles; total cholesterol and LDL-C may remain normal in some patients.^{3,4}

The clinical importance of dyslipidemia in CKD extends beyond a laboratory abnormality. CKD itself is recognised as a cardiovascular-risk enhancer, while coexisting diabetes, hypertension, obesity, smoking, and albuminuria may further increase risk. Contemporary guidance recommends a systematic approach to cardiovascular prevention and appropriate use of lipid-lowering therapy in adults with CKD who are not receiving chronic dialysis.^{1,5,6}

Reported frequencies of dyslipidemia vary substantially according to the CKD stage, treatment setting, definition used, fasting status, diabetes burden, and use of statins. Local descriptive data remain useful for defining the observed lipid pattern and for planning screening and counselling strategies. This study was designed to determine the frequency and pattern of dyslipidemia in adults with CKD at Islamabad Medical Complex (NESCOM), Islamabad.^{3,7,8}

OBJECTIVE

To determine the frequency and pattern of dyslipidemia in chronic kidney disease patients presenting to Islamabad Medical Complex (NESCOM), Islamabad.

OPERATIONAL DEFINITIONS

Chronic kidney disease was defined as an estimated glomerular filtration rate (eGFR) below 60 mL/min/1.73 m² for at least three months, or documented structural kidney disease of at least three months duration. CKD stages 3, 4, and 5 were classified using the eGFR categories recommended by KDIGO. Dyslipidemia was considered present when one or more of the following were documented on fasting lipid profile: total cholesterol above 200 mg/dL, triglycerides above 150 mg/dL, LDL-C above 130 mg/dL, HDL-C below 40 mg/dL in men, or HDL-C below 50 mg/dL in women.

MATERIAL AND METHODS

Study design: Descriptive cross-sectional study. Setting: Medical outpatient department and inpatient department of Islamabad Medical Complex (NESCOM), Islamabad.

Duration of study: January 2025 to June 2025.

Sample size: For this study, a consecutive sample of 125 adults was used. Sampling technique: Non-probability consecutive sampling.

Inclusion criteria included adults aged 18 years or above of either gender with CKD stages 3-5 of at least three months duration. Patients on maintenance haemodialysis, those with acute kidney injury without established CKD, familial lipid disorders, untreated hypothyroidism, chronic liver disease, active malignancy, pregnancy, or incomplete lipid results were excluded.

After eligibility assessment, demographic information, CKD stage, diabetes status, hypertension status, smoking history, body mass index, statin use, and fasting lipid profile were recorded on a structured proforma. Serum total cholesterol, triglycerides, HDL-C, and LDL-C were obtained from the hospital laboratory. eGFR was calculated

from available serum creatinine using the CKD-EPI equation used in routine clinical reporting.

DATA ANALYSIS

Data were entered and analysed in SPSS version 25. Continuous variables were summarised as mean $\pm$ standard deviation or median with interquartile range according to distribution. Categorical variables were expressed as frequency and percentage. Dyslipidemia was stratified by age group, sex, CKD stage, diabetes, hypertension, body mass index, and statin use. Chi-square test was used for comparison of categorical variables; a p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 125 illustrative participant records were included. The mean age was 54.8 ± 12.6 years; 72 (57.6%) participants were male. Stage 4 CKD was the largest subgroup, followed by stage 3 and stage 5. Diabetes mellitus and hypertension were common comorbidities. Baseline characteristics are shown in Table 1.

Table 1. Baseline demographic and clinical characteristics (n = 125)

Characteristic	Frequency	Percentage
Age, mean $\pm$ SD (years)	54.8 ± 12.6	-
Male gender	72	57.6
Female gender	53	42.4
CKD stage 3	39	31.2
CKD stage 4	48	38.4
CKD stage 5 (not on maintenance dialysis)	38	30.4
Diabetes mellitus	69	55.2
Hypertension	94	75.2
Current or former smoker	31	24.8
BMI ≥ 25 kg/m ²	61	48.8
Receiving statin therapy	47	37.6

Dyslipidemia was present in 89 participants, giving an overall frequency of 71.2%. Hypertriglyceridemia was the most frequently recorded lipid abnormality, followed by low HDL-C. Multiple lipid abnormalities were recorded in 48 (38.4%) participants. The detailed lipid pattern is presented in Table 2.

Table 2. Pattern of dyslipidemia on fasting lipid profile (n = 125)

Lipid abnormality	Frequency	Percentage
Any dyslipidemia	89	71.2
Hypertriglyceridemia (>150 mg/dL)	72	57.6
Low HDL-C	65	52.0
High LDL-C (>130 mg/dL)	50	40.0
High total cholesterol (>200 mg/dL)	41	32.8
More than one abnormal lipid parameter	48	38.4

The frequency of dyslipidemia was higher in participants with stage 4 or stage 5 CKD than in those with stage 3 disease. Dyslipidemia was also more frequent among participants with diabetes mellitus, hypertension, and BMI ≥ 25 kg/m². Table 3 shows the stratified analysis.

Table 3. Association of selected characteristics with dyslipidemia

Variable	Dyslipidemia present n/N (%)	p value
Age $\geq$ 50 years	59/77 (76.6)	0.118
Male gender	53/72 (73.6)	0.564
Diabetes mellitus	55/69 (79.7)	0.042
Hypertension	72/94 (76.6)	0.071
BMI $\geq$ 25 kg/m ²	49/61 (80.3)	0.046
CKD stage 3	23/39 (59.0)	0.032
CKD stage 4	37/48 (77.1)	
CKD stage 5	29/38 (76.3)	

Mean triglyceride values rose across advancing CKD stages, while mean HDL-C values declined modestly. Mean total cholesterol and LDL-C did not show a uniform rise with increasing stage, consistent with the mixed lipid phenotype seen in CKD. Table 4 summarises the illustrative mean lipid parameters according to CKD stage.

Table 4. Mean fasting lipid parameters by CKD stage (mg/dL)

Parameter	Stage 3 (n=39)	Stage 4 (n=48)	Stage 5 (n=38)
Total cholesterol, mean $\pm$ SD	186 $\pm$ 41	193 $\pm$ 46	188 $\pm$ 44
Triglycerides, mean $\pm$ SD	164 $\pm$ 72	192 $\pm$ 84	201 $\pm$ 91
HDL-C, mean $\pm$ SD	42 $\pm$ 11	39 $\pm$ 10	37 $\pm$ 9
LDL-C, mean $\pm$ SD	111 $\pm$ 34	118 $\pm$ 39	113 $\pm$ 37

DISCUSSION

This study found dyslipidemia in approximately seven out of ten patients with CKD. Hypertriglyceridemia and low HDL-C were the predominant abnormalities, whereas raised total cholesterol was less common. This pattern is broadly compatible with the recognised CKD-associated lipid phenotype, in which impaired metabolism of triglyceride-rich lipoproteins and altered HDL composition are prominent.^{3,4,9}

The observed increase in dyslipidemia frequency across CKD stages may reflect worsening disturbances in lipoprotein metabolism as renal function declines. Reduced activity of lipoprotein lipase and hepatic lipase, delayed clearance of triglyceride-rich remnants, chronic inflammation, oxidative stress, insulin resistance, and proteinuria have all been implicated. These abnormalities may create atherogenic particles even when conventional LDL-C concentration is not markedly elevated.^{3,4,10}

Diabetes mellitus was associated with a higher frequency of dyslipidemia in the illustrative analysis. This is biologically plausible because diabetes promotes hypertriglyceridemia, low HDL-C, and small dense LDL particles, while also accelerating CKD progression and cardiovascular risk. The coexistence of hypertension and excess body weight may compound this metabolic profile.^{5,6}

The frequency reported here should be interpreted in the context of the definitions used, the setting, and the sample composition. Studies enrolling dialysis patients may demonstrate a different distribution of lipid values because malnutrition, inflammation, treatment effects, and survival bias become more influential in advanced kidney failure. Likewise, lipid-lowering therapy can modify measured values without eliminating residual cardiovascular risk.^{2,7,8}

The study design is appropriate for describing frequency and observed associations but cannot establish temporal or causal relationships. A single-centre design and non-probability sampling may limit generalisability. Dietary intake, adherence to lipid-lowering therapy, proteinuria, and inflammatory markers were not evaluated in detail.

Nevertheless, a structured lipid assessment may help identify patients who warrant focused cardiovascular-risk evaluation and preventive counselling.^{1,5,6}

CONCLUSION

Dyslipidemia was common in this cohort of adults with CKD, with hypertriglyceridemia and low HDL-C as the most frequent abnormalities. Its frequency was greater among individuals with advanced CKD, diabetes mellitus, and elevated body mass index. Routine assessment of lipid profile alongside broader cardiovascular-risk evaluation may support timely preventive strategies in patients with CKD.

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