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# Assessment of Fasting Lipid Profile and Its Association with Renal Function in Patients with Chronic Kidney Disease: A Hospital-Based Cross-Sectional Study

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

**Abstract**

**Background**: The present study is undertaken to assess the fasting lipid profile in patients with chronic kidney disease and to evaluate the pattern of lipid abnormalities and their association with the severity of renal dysfunction.

**Methods**: This is a cross-sectional observational study conducted about lipid profile on CKD patients with normal healthy controls at our hospital after considering inclusion and exclusion criteria. Lipid profile was collected from eligible patients and controls.

**Results**: There were a statistically significant decrease in HDL and increase in triglyceride, low-density lipoprotein (LDL), and total cholesterol levels when compared with normal healthy controls.

**Conclusion**: Treatment of dyslipidemia helps to decrease mortality in CKD patients.

**Keywords:** Chronic kidney disease, Hypertriglyceridemia, Lipid profile

## Introduction

Chronic kidney disease (CKD) is a major global public health problem characterized by persistent abnormalities in kidney structure or function lasting for more than three months. It is associated with progressive decline in renal function, accumulation of metabolic waste products, fluid and electrolyte disturbances, and various metabolic complications. CKD is associated with significant morbidity and mortality, particularly due to cardiovascular complications, which represent one of the leading causes of death among patients with impaired renal function.[1]

Dyslipidemia is a common metabolic abnormality observed in patients with chronic kidney disease. Alterations in lipid metabolism occur as a consequence

of impaired renal function and disturbances in lipoprotein metabolism. These abnormalities may include elevated serum triglyceride levels, reduced high-density lipoprotein (HDL) cholesterol, alterations in low-density lipoprotein (LDL) particles, and changes in total cholesterol levels. The pattern of dyslipidemia may vary depending on the severity and stage of CKD, the underlying cause of renal disease, nutritional status, and associated metabolic disorders.[2]

The pathophysiology of CKD-associated dyslipidemia involves impaired clearance of triglyceride-rich lipoproteins, reduced activity of lipoprotein lipase and hepatic lipase, altered apolipoprotein metabolism, and decreased catabolism of circulating lipoproteins. These disturbances contribute to abnormal lipid accumulation in the circulation and may promote endothelial dysfunction, oxidative stress, inflammation, and atherosclerosis. Consequently, patients with CKD are at increased risk of cardiovascular disease, including coronary artery disease and other atherosclerotic complications.[3]

Fasting lipid profile is a routinely performed biochemical investigation used for the assessment of lipid metabolism and cardiovascular risk. It includes measurement of total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C), with very-low-density lipoprotein cholesterol (VLDL-C) often calculated or estimated. Evaluation of these parameters provides useful information regarding the pattern of dyslipidemia and may help identify patients at increased risk of cardiovascular complications.[4]

The relationship between lipid abnormalities and renal function is clinically important. Progressive deterioration in glomerular filtration rate may be associated with worsening abnormalities in lipid metabolism. However, the lipid profile in CKD patients may vary according to the stage of disease, presence of diabetes mellitus, hypertension, obesity, proteinuria, and treatment status. Therefore, evaluation of lipid parameters in relation to renal function may provide a better understanding of the metabolic alterations associated with CKD.[5]

Early identification of dyslipidemia in patients with chronic kidney disease is important for comprehensive clinical assessment and cardiovascular risk management. Assessment of fasting lipid profile may help characterize lipid abnormalities in these patients and provide additional information for clinical evaluation and management.[6-7]

Therefore, the present study is undertaken to assess the fasting lipid profile in patients with chronic kidney disease and to evaluate the pattern of lipid abnormalities and their association with the severity of renal dysfunction.

**Materials and Methods**

This cross-sectional observational study was conducted in 50 patients with CKD and 50 normal healthy persons.

**Inclusion Criteria**

- Patients between the age group of 15 and 85 years with established CKD.
- Patients who were on conservative or dialysis treatment for CKD.
- Established renal failure was ensured by radiological evidence or biochemical evidence for >3 months.

Inclusion Criteria for Controls- Normal healthy patients who were age and sex related to patients were included as controls.

**Exclusion Criteria**

- Patients with acute renal failure and nephrotic syndrome.



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- Patients having diabetes, liver disease, Cushing's, or other metabolic disorder.
- Those who are on drugs affecting lipid metabolism such as β-blockers, statins, and oral contraceptive pills.
- Female patients who were pregnant.

Written consent was obtained from both patients and controls. A detailed history regarding symptoms and duration of the kidney disease, hypertension, diabetes, smoking, alcoholism, drug intake, and treatment was elicited.

A detailed clinical examination was performed in all patients. Blood pressure, renal function tests, and abdominal ultrasonogram were done for all patients. Blood sample was taken for lipid profile from patients and controls.

**Results**

Table 1: Distribution of age and sex ratio

| | No. of cases | Age | Sex ratio (Male: Female) |
|---|---|---|---|
| Control | 50 | 48.52 ±7.14 | 38:12 |
| CKD Patients | 50 | 49.12±7.02 | 34:16 |
| p-value | | >0.05 | >0.05 |

Table 2: The level of total cholesterol among the cases of CKD and control group

| Total Cholesterol | No. of cases | Mean ± S.D. | p-value |
|---|---|---|---|
| Control | 50 | 181.46 ± 16.84 | 0.001 |
| CKD Patients | 50 | 208.42 ± 39.84 | |

Table 3: The level of HDL among the cases of CKD and control group

| HDL | No. of cases | Mean ± S.D. | p-value |
|---|---|---|---|
| Control | 50 | 52.43 ± 4.02 | 0.001 |
| CKD Patients | 50 | 42.22 ± 11.54 | |

Table 4: The level of LDL among the cases of CKD and control group

| LDL | No. of cases | Mean ± S.D. | p-value |
|---|---|---|---|
| Control | 50 | 111.43 ± 13.42 | 0.001 |
| CKD Patients | 50 | 132.42 ± 24.24 | |

Table 5: The level of Triglycerides among the cases of CKD and control group

| Triglycerides | No. of cases | Mean ± S.D. | p-value |
|---|---|---|---|
| Control | 50 | 109.24 ± 15.24 | 0.001 |
| CKD Patients | 50 | 180.23 ± 49.23 | |

**Discussion**

Total cholesterol levels were significantly elevated in our study group. We observed the same findings in the study by Lee et al. [8] However, most of the studies did not observe hypercholesterolemia. The possible reason for the hypercholesterolemia in our study is significant elevation of cholesterol-containing lipid fractions (IDL and LDL).

The low HDL levels in patients with CKD in our study were consistent with Lee et al.[8] who studied the lipid



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profile in CKD patients. Several mechanisms may underlie these reductions in HDLC levels, which is usually an indication of impaired reverse cholesterol transport. Thus, uremic patients usually exhibit decreased levels of apolipoprotein AI and AII (the main protein constituent of HDL). Diminished activity of LCAT (the enzyme responsible for the esterification of free cholesterol in HDL particles) as well as increased activity of cholesterol ester transfers protein that facilitates the transfer of cholesterol esters from

HDL to TGL-rich lipoproteins that reduce serum concentrations of HDL cholesterol. In MDRD study, low HDL levels in CKD patients were one of the independent risk factors for the progression of kidney disease.

LDL was significantly elevated than that of controls in our study. This observation is similar to the studies of Lee et al[8]. In an article published in archives of internal medicine, 32 patients were studied and compared the lipid profile on CKD and non-CKD patients.[9]

Triglycerides were significantly elevated in our study than control group. Shah et al. most western studies demonstrated that hypertriglyceridemia was the abnormality found in CKD patients. Gupta et al.[10], Das et al.[11], Bagdade et al[12], and Chan et al.[13] also found that hypertriglyceridemia was the major abnormality in their studies.

**Conclusion**

This cross sectional study showed that high serum cholesterol, LDL, triglyceride and low HDL cholesterol were found in CKD patients.

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