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Original Research Article

The Study of Pattern of the Lipid Profile in Patients with CKD

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ABSTRACT

Background
Patients with chronic kidney disease are at an increased risk of developing cardiovascular disorders due to accelerated atherosclerosis & various other variables, including abnormalities in their atherogenic lipid profiles. The present study was conducted to "assess the study of pattern of the Lipid Profile in patients with chronic kidney disease".

Methods
The present cross-sectional, observational study was conducted at department of General Medicine of a Tertiary Care Centre during the study period of one year among 50 patients who visited the department OPD & diagnosed with CKD. A detailed clinical examination was performed in all patients & results were analyzed using SPSS version 25.0.

Results
The mean age of patients was 43.26±10.21 years. 60% of patients were male & 40% were female. The mean BMI of patients was 22.31±3.21. The mean value of cholesterol was 135.12±41.23, triglycerides was 162.23±55.34, HDL was 45.32±12.23, VLDL 30.56±10.23 & LDL was 65.23±30.92. 4 (8%) patients had stage I, 7 (14%) had stage II, 15 (30%) had stage III , 14 (28%) had stage IV & 5 (10%) had stage V. Compared to other stages, Stages 4 & 5 of chronic renal disease had considerably higher mean TC, triglycerides, VLDL cholesterol, & LDL cholesterol.

Conclusion
The present study showed that individuals with chronic kidney disease exhibit significant lipid metabolism anomalies, which may lead to atherosclerosis & cardiovascular disease, thereby elevating morbidity & mortality rates in this population.

Keywords - abnormality, chronic kidney disease, dyslipidaemia, lipid profile, risk.

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INTRODUCTION

Chronic kidney disease (CKD) is a global public health issue with an estimated 8-16% prevalence worldwide [1,2] The prevalence of CKD in India is not clearly established due to the absence of a national registry. It is projected that the prevalence of CKD in India may reach 785 individuals per million population [3]. CKD progressively advances to end-stage renal disease (ESRD), typically accompanied by elevated cardiovascular morbidity & mortality. Patients with CKD are more predisposed to mortality from cardiovascular problems than those with ESRD [4].

Dyslipidaemias are prevalent among people with CKD. Lipoprotein metabolism problems manifest in the early stages of chronic renal failure & may have a decremental pattern corresponding to the decline in renal function. Research indicates that dyslipidaemias can result in cardiovascular disease & deterioration of renal function. The lipid abnormalities typically observed in CKD patients include elevated triglyceride levels, normal or decreased total cholesterol (TC), reduced high-density lipoprotein (HDL) levels, & normal low-density lipoprotein (LDL) levels. [5]

Similar to the atherogenic dyslipidaemia seen in insulin-resistant people, chronic renal illness patients also experienced secondary dyslipidaemia. Small, dense LDL particles, elevated VLDL, decreased HDL cholesterol, & elevated blood triglycerides are the hallmarks of this condition.

These particles' triglyceride-rich Apolipoprotein B, which is made up of complicated lipoproteins, demonstrated significant atherogenic potential [6]. Ninety percent of people with nephrotic syndrome, twenty percent of people with CKD, thirty percent of people with CKD without nephrotic syndrome, & the general population had increased cholesterol levels (>240 mg/dl) [7-9]. High triglycerides (>200 mg/dl) were found in 60% of people with nephrotic syndrome, 15% of people with CKD, 40% of those with CKD without nephrotic syndrome, & the general population [8, 9]. Compared to non-uremic individuals, patients with chronic renal disease usually have lower plasma HDL cholesterol levels; also, the distribution of HDL sub-fractions varies. Reduced apo-AIV levels & decreased lecithin cholesterol acyltransferase activity in uremia impair the esterification of free cholesterol & the conversion of HDL3 to HDL2 [10].

Therefore, it is crucial to analyse the lipoprotein subtype in CRF patients in order to evaluate the clinical outcome. In order to evaluate the pattern of the Lipid Profile in patients with chronic renal disease, the current study was carried out.

MATERIAL & METHODS

The present cross-sectional, observational study was conducted at department of General Medicine of a Tertiary Care Centre during the study period of one year. Ethical clearance was taken from institutional ethics committee of the hospital & patients were asked to sign an informed consent form before commencement of the study.

Though convenience sampling a total of 50 patients who visited the department OPD & diagnosed with CKD were selected on the basis of inclusion & exclusion criteria.

Inclusion criteria

1. Patients with age over 18 years & up to 60 years.
2. Patients with Glomerular Filtration Rate (GFR) < 60 ml/min.

Exclusion criteria

1. Patient not giving consent for the study
2. Patients with BMI>30.

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3. Patients with co-morbidity like Acute Kidney Injury, Diabetes Mellitus, Ischemic heart disease, Hypothyroidism.
4. Patients already taking medicine related to lipid profile.

Every patient underwent a thorough clinical assessment. Every patient had an abdominal ultrasound, blood pressure checks, & renal function testing performed. For the lipid profile, a blood sample was obtained from each patient.
After being collected, all specimens were inspected within four to six hours. Triglycerides & total cholesterol in plasma were measured by enzymes, & HDL-C levels were determined by measuring cholesterol in the supernatant after apolipoprotein B (Apo-B)-containing lipoproteins precipitated. The Friedewald formula is used to compute the LDL-C.
In clinical practice, the Friedewald formula is the most accurate & useful way to calculate LDL-C.
Total cholesterol minus [HDL-C + (Triglycerides/5)] equals LDL-C.
The ratio of cholesterol to triglycerides in very-low-density lipoprotein (VLDL) particles is determined by dividing plasma triglycerides by 5. When the triglyceride level is less than 350 mg/dL & the test resolution is obtained from fasting plasma, this formula is considered to be adequately accurate. Ultracentrifugation methods are required for the accurate measurement of LDL-C levels when triglyceride levels are high (Beta quantification).

Statistical analysis
The data gathered for all selected cases were documented in a master chart. Data analysis was done using software SPSS 25.0. This software was utilized to compute range, frequencies, percentages, means, standard deviations, chi-square, & p-values. The Kruskal–Wallis chi-square test was employed to assess the significance of differences among quantitative variables. A p-value below 0.05 was considered indicative of a significant association.

RESULTS

The mean age of patients was 43.26±10.21 years. 60% of patients were male & 40% were female. The mean BMI of patients was 22.31±3.21 as shown in table 1.

Variable		Values
Mean age (years)		43.26±10.21
Gender	Male	30 (60)
	Female	20 (40)
Mean BMI		22.31±3.21

Table 1 Demographic data of patients

The mean values of renal function test were urea (158.23±50.12), creatinine (8.32±3.78), uric acid (11.23±20.12), calcium (7.15±0.92), phosphorous (11.23±16.54), alkaline phosphatase (103.24±40.21), Chloride (98.87±12.24), Sodium (134.56±7.56) & Potassium (5.03±1.10) as shown in table 2.

Renal function tests	Values
Urea	158.23±50.12
Creatinine	8.32±3.78
Uric acid	11.23±20.12
Calcium	7.15±0.92
Phosphorus	11.23±16.54

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Alkaline phosphatase	103.24±40.21
Chloride	98.87±12.24
Sodium	134.56±7.56
Potassium	5.03±1.10

Table 2 Characteristics of renal function tests

The mean value of cholesterol was 135.12±41.23, triglycerides was 162.23±55.34, HDL was 45.32±12.23, VLDL 30.56±10.23 & LDL was 65.23±30.92 as shown in table 3.

Lipid profile	Values
Cholesterol	135.12±41.23
Triglycerides	162.23±55.34
HDL cholesterol	45.32±12.23
VLDL cholesterol	30.56±10.23
LDL cholesterol	65.23±30.92

Table 3 Lipid profile of patients

Out of 50 patients 4 (8%) patients had stage I, 7 (14%) had stage II, 15 (30%) had stage III , 14 (28%) had stage IV & 5 (10%) had stage V as shown in figure 1.

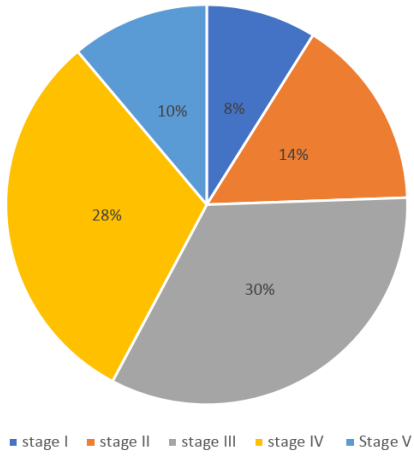

Figure 1 Distribution of patients according to stages of CKD

Between stages of chronic renal disease, the mean TC, triglycerides, HDL cholesterol, VLDL cholesterol, & LDL cholesterol were compared. As seen in Table 4, the mean levels of total cholesterol, triglycerides, VLDL cholesterol, & LDL cholesterol were significantly higher in Stages 4 & 5 of chronic renal disease than in previous stages.

Lipid profile	Stage I	Stage II	Stage III	Stage IV	Stage V	P value
Cholesterol	110.14±39.2	113.12±40.1	116.34±41.2	145.42±23.3	147.67±33.2	0.003
Triglycerides	137.03±52.2	139.21±46.3	141.23±50.2	173.2±64.4	163.2±50.23	0.043
HDL cholesterol	39.33±21.2	40.15±20.1	42.34±21.3	50.34±11.2	47.58±13.4	0.230
VLDL cholesterol	26.06±9.33	27.34±10.33	29.05±11.34	37.89±12.4	34.28±11.56	0.025
LDL cholesterol	43.10±17.30	45.12±20.13	47.23±23.10	66.34±11.23	75.43±32.13	0.001

Table 4: Comparison of lipid profile with stages of CKD

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DISCUSSION

Chronic kidney disease occurs when a pathological process compromises the structural or functional integrity of the kidneys. Chronic kidney failure is a consequence of CKD. Cardiovascular illness is a significant cause of mortality in individuals with mild-to-moderate CKD & ESRD.

Dyslipidaemia is recognised as a prominent traditional risk factor for cardiovascular disease in the general population, & it is well established that patients with CKD demonstrate significant disruptions in lipoprotein metabolism, which, in advanced stages, may lead to severe dyslipidaemia. [11]

The present study was conducted at department of medicine of a tertiary care centre among 50 patients diagnosed with CKD to assess the study of pattern of the Lipid Profile in patients with chronic kidney disease. In our study the mean age of patients was 43.26±10.21 years. 60% of patients were male & 40% were female. The mean BMI of patients was 22.31±3.21. Results were similar to study done by Adejumo et al reported a mean age of 46.98±16.81 years. Kumari & Srinivas determined the mean age of CKD patients to be 45.28 years, with a male proportion of 68% & a female percentage of 32%. [12,13]

In ours study the mean value of cholesterol was 135.12±41.23, triglycerides was 162.23±55.34, HDL was 45.32±12.23, VLDL 30.56±10.23 & LDL was 65.23±30.92. Mohanraj et al. reported comparable findings, with the study group's mean triglyceride level at 197.26 mg/dl, contrasted with 178.18 mg/dl in the control group.[14] Similarly, Lodh et al. observed a disrupted lipid profile, marked by a statistically significant increase in total cholesterol & triglyceride levels, alongside significantly reduced HDL levels compared to the controls. [15]

Pavlakou et al [10] determined that the prevalence of hypertriglyceridemia in the Indian population was 29.5%. Kasper et al [16] & Pandya et al [1] assert that hypertriglyceridemia is the most prevalent lipid profile anomaly observed in patients with CKD. Prior research on the lipid profiles of CKD patients assessed the prevalence of particular lipid abnormalities rather than the overall prevalence of dyslipidaemia within the community. Nonetheless, this incidence is elevated within the paediatric chronic kidney disease population, with a comprehensive occurrence rate of 45% [2]. The lower prevalence in the latter study may be attributed to the definition of dyslipidaemia, as the study was conducted in a paediatric population [17].

All stages of chronic renal illness were compared in terms of average levels of total cholesterol, triglycerides, HDL cholesterol, VLDL cholesterol, & LDL cholesterol. Compared to other stages in our study, Stages 4 & 5 of chronic renal illness had considerably higher average levels of total cholesterol, triglycerides, VLDL cholesterol, & LDL cholesterol. Similar to the results of Rao et al., group 1 (stage I & II patients with a GFR between 60 & 119 ml/min/1.73m2) & group 2 (stage III & IV patients with a GFR between 15 & 59 ml/min/1.73m2) showed hypertriglyceridemia in comparison to controls. [18] Higher serum total & LDL cholesterol levels were seen in stages 3 & 4 of chronic kidney hypertriglyceridemia in renal failure are decreased lipoprotein lipase (LPL) activity & the direct inhibitory effects of several uremic toxins on enzymes involved in lipid metabolism, which lead to elevated triglyceride levels.

Research in India indicates that individuals with early-stage ESRD do not exhibit elevated cholesterol levels, which remain at typical or lower levels. In contrast, Western research report greater cholesterol levels in CKD populations. This may be attributable to variations in dietary practices. Our investigation revealed that elevated cholesterol levels were considerably observed in Stage 4 & 5 chronic renal disease. Michael et al. observed contradictory results, indicating low cholesterol levels in ESRD patients, with statistical significance. [19,20]

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Small sample size is the main limitation of our study & hence results can not be generalized to overall population.

CONCLUSION

In CKD, lipid abnormalities are common. A worse prognosis & increased mortality rate are linked to CKD when changes in lipid & carbohydrate metabolism are combined with the progression of CKD to increase the risk of atherogenesis. This emphasizes how important it is to regularly check & maintain lipid profiles in CKD patients, even in the early stages, in order to prevent cardiovascular morbidity & death. Multicentric research should be prioritized in order to provide a conclusive understanding of the patterns of lipid profiles in individuals with chronic kidney disease.

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