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Medicine

A STUDY OF LIPID PROFILE IN CHRONIC KIDNEY DISEASE IN NON DIABETIC PATIENTS: A SINGLE CENTRE STUDY

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ABSTRACT **Introduction:** Cardiovascular Disease (CVD) occurs more frequently and is the leading cause of death in Chronic Kidney Disease (CKD). Dyslipidemia has been established as an important risk factor in the pathogenesis of CVD in CKD patients. **Objectives:** To note alteration in lipid profile in non- diabetic CKD patients and variation in different lipoprotein fractions with the severity of chronic kidney disease. **Methods:** A cross-sectional study was conducted at Department of General Medicine (Nephrology Unit), SRMS IMS Bareilly involving 50 non diabetic CKD patients. **Results:** The study analyzed the association between lipid profile parameters and the severity of chronic kidney disease (CKD). The data indicated that patients with more advanced CKD (stages 4/5) exhibited higher mean levels of serum cholesterol, triglycerides, LDL, and VLDL, while HDL levels were lower compared to those in stages 2/3. However, these differences were not statistically significant ($p > 0.05$). **Discussion:** Despite the lack of statistically significant differences in lipid parameters across CKD stages, the direction of changes suggests a worsening lipid profile with disease progression. **Conclusion:** Lipid abnormalities in chronic kidney disease accelerate progression of the kidney disease and predispose to atherosclerosis, it is worth detecting and treating hyperlipidemia in these patients.

KEYWORDS : Chronic Kidney Disease, Dyslipidemia, Cardiovascular risk, Non diabetic

INTRODUCTION

Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function, and a progressive decline in glomerular filtration rate (GFR). CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health[1].

In India, diabetes and hypertension today account for 40-60% cases of CKD[2]. Among the cause of deaths in CKD patients, Cardio- Vascular Disease (CVD) is emerging as the most common cause of death in patients with End Stage Renal Disease (ESRD). Age adjusted CVD mortality is about 30 times higher in ESRD than in the general population[3].

Dyslipidaemia has been established as a well known risk factor for CVD in general population and large-scale observational studies have shown that total and low- density lipoprotein (LDL)- cholesterol values are two of the most independent predictors of cardiovascular morbidity and mortality[4].

Although lipid abnormalities were originally considered as complications of ESRD, these changes can be present in early stages of CKD and may actively participate in the pathogenesis of serious complications such as atherosclerotic vascular disease. Although the nature of dyslipidaemia can be significantly influenced by several intrinsic (nephrotic range proteinuria, concomitant diseases such as diabetes mellitus, hereditary disorders of lipid metabolism or exogenous (erythropoietin administration, drugs such as steroids, calcineurin inhibitors, etc.) factors, the most common quantitative lipid abnormalities in pre-dialysis CKD patients are hypertriglyceridemia, increased concentrations of triglyceride rich lipoprotein remnants, reduced high- density lipoprotein (HDL)-cholesterol levels as well as increased concentrations of lipoprotein (a). Notably, total and LDL cholesterol levels are usually within normal limits or slightly reduced in these individuals[5].

AIMS AND OBJECTIVES

1. To note alteration in lipid profile in non- diabetic CKD patients.
2. To note the variation in different lipoprotein fractions with the severity of chronic kidney disease.

MATERIALS AND METHODS

Study Design: Cross sectional study

Study Period: 01/05/2023 – 31/10/2024 (18 months)

Study Subjects: The study was conducted on 50 non diabetic CKD patients aged 18 years or more, both male and females, in OPD, in patient wards and ICU admitted under Department of Medicine (Nephrology Unit) in SRMS IMS Bareilly.

Sampling Method: After a minimum of 8 hours of fasting, about 10ml of blood was drawn from cubital fossa in dried glass vial. Serum was separated within 2 hours. After centrifugation at 5000 rpm for 10 minutes, the supernatant clear serum was analysed on the same day or within 48 hours. Urea was also obtained from the same sample.

Inclusion Criteria: Patients age >18 years old, with chronic kidney disease, who gave consent for study.

Exclusion Criteria: Not completed 18 years of age as on 1/05/2023, Patients with Diabetes Mellitus, Patients already on lipid lowering therapy, Not willing to participate, Renal Transplant patient Clinical Criteria for Chronic Kidney Disease (KDIGO 2012):
The following criteria were used to establish chronic kidney disease:

- Albuminuria (>30mg in 24 hrs)
- Urine sediment abnormalities
- Electrolyte and other abnormalities due to tubular disorders
- Abnormalities detected by histology
- Structural abnormalities detected by imaging
- Decreased GFR
- GFR < 60ml/min/1.73m2 (GFR categories G2- G5)

Statistical Analysis: Statistical software SPSS v 25.0 was used for analysis of data. The 'p' value less than 0.05 was considered statistically significant.

RESULTS

A majority of patients (66%) had urea levels ≥160 mg/dL, indicating a high burden of azotemia. 12% subjects had urea levels 120 – 159.9 mg/dL, just 8% fell within 80- 119.9 mg/dL range, and only 2% had urea levels below 80 mg/dL.

Table 1:- Stage Distribution.

Stage	GFR, mL/min per 1.73 m^2
0	>90
1	90

2	60-89
3	30-59
4	15-29
5	<15

The majority of patients (68%) fell in CKD stage 5, reflecting a significant degree of renal impairment. Only 18% were in CKD stage 4 and 14% in CKD stage 2/3, indicating that few patients were in the early stages of CKD.

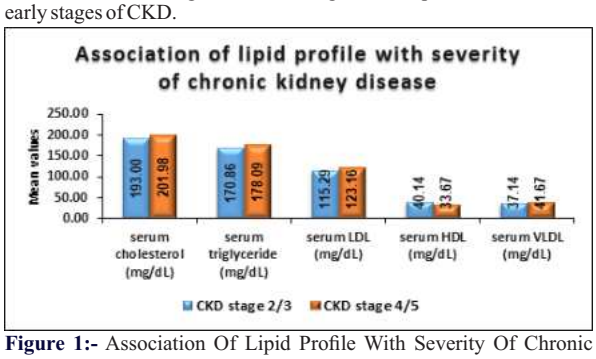

Figure 1:- Association Of Lipid Profile With Severity Of Chronic Kidney Disease.

Slight increase in mean cholesterol in advanced CKD reflects lipid accumulation due to reduced clearance. Triglyceride levels were higher in advanced stages, due to impaired triglyceride metabolism and reduced lipoprotein lipase activity.LDL levels were mild increased and HDL levels were lower in stage 4/5, suggesting early atherogenic lipid changes as kidney function declines. An increase in VLDL with CKD progression reflects defective catabolism of triglyceride-rich lipoproteins.

Table 2:-Association Of Lipid Parameters With Severity Of Chronic Kidney Disease.

Parameter	Category	CKD Stage 2/3 (n=7)	CKD Stage 4/5 (n=43)	Total (n=50)
Serum Cholesterol (mg/dL)	<200	3 (42.86%)	20 (46.51%)	23 (46%)
	≥200	4 (57.14%)	23 (53.49%)	27 (54%)
Serum Triglyceride (mg/dL)	<150	2 (28.57%)	16 (37.21%)	18 (36%)
	≥150	5 (71.43%)	27 (62.79%)	32 (64%)
Serum LDL (mg/dL)	<100	3 (42.86%)	11 (25.58%)	14 (28%)
	≥100	4 (57.14%)	32 (74.42%)	36 (72%)
Serum HDL (mg/dL)	<45	4 (57.14%)	35 (81.40%)	39 (78%)
	≥45	3 (42.86%)	8 (18.60%)	11 (22%)
Serum VLDL (mg/dL)	<30	3 (42.86%)	13 (30.23%)	16 (32%)
	30–59.9	3 (42.86%)	22 (51.16%)	25 (50%)
	≥60	1 (14.29%)	8 (18.60%)	9 (18%)
Total		7 (100%)	43 (100%)	50 (100%)

There are consistent trends suggesting that advanced CKD (stages 4/5) is associated with higher levels of total cholesterol, triglycerides, LDL, VLDL and lower levels of HDL. These findings support the known dysregulation of lipid metabolism in CKD, particularly the accumulation of atherogenic lipoproteins as kidney function declines which contributes to the elevated cardiovascular risk seen in these patients.

DISCUSSION

The findings of the study align with known pathophysiological mechanisms. As CKD progresses, abnormalities in lipid metabolism become more pronounced due to decreased lipoprotein lipase activity, insulin resistance, and chronic inflammation[6]. The elevated triglycerides and VLDL, along with reduced HDL, are characteristic of atherogenic dyslipidemia commonly seen in CKD patients[7]. The elevated LDL and triglyceride levels in advanced stages mirror findings by Kwan BC et al who observed similar trends among patients with reduced renal function[6]. HDL levels were lower in stages 4/5 CKD in our study, consistent with prior reports suggesting that CKD is associated with decreased HDL synthesis and activity[8].

Lipid abnormalities in CKD often present as hypertriglyceridemia and low HDL, while total cholesterol levels may remain relatively normal or only modestly elevated until end-stage renal disease (ESRD)[9]. This aligns with the findings in the current study. The Chronic Renal Insufficiency Cohort (CRIC) study reported that while dyslipidemia is common in CKD, total cholesterol was not independently predictive of CKD progression, suggesting that other lipid components or metabolic factors may play a larger role[10].In a meta-analysis by Tonelli M et al, dyslipidemia was found to be a significant predictor of cardiovascular morbidity in CKD, independent of traditional risk factors[11]. Dyslipidemia in CKD not only exacerbates kidney damage through lipid-mediated nephrotoxicity but also significantly contributes to the elevated cardiovascular risk in this population. Therefore, early identification and management of lipid abnormalities in CKD are crucial. Current KDIGO guidelines recommend statin therapy in non-dialysis CKD patients over 50 years to mitigate cardiovascular risk[12].

CONCLUSION

The study analyzed the association between lipid profile parameters and the severity of chronic kidney disease (CKD). The data indicated that patients with more advanced CKD (stages 4/5) exhibited higher mean levels of serum cholesterol, triglycerides, LDL, and VLDL, while HDL levels were lower compared to those in stages 2/3. However, these differences were not statistically significant ($p > 0.05$). A notable finding was the statistically significant negative correlation between serum VLDL and GFR ($r = -0.322$, $p = 0.023$), suggesting that as renal function deteriorates, VLDL levels increase. Other lipid parameters did not show significant correlations with GFR.

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