

Chronic Kidney Disease and Dyslipidemias

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Abstract

Introduction: Patients of chronic kidney disease (CKD), like patients of end-stage renal disease, those who were treated with dialysis, or renal transplant recipients have an increased risk for cardiovascular disease (CVD) morbidity and mortality. Dyslipidemia is commonly seen in CKD patients, CKD is an important risk factor for cardiovascular disease (CVD) development. The purpose of this study was to know the significance of dyslipidemia in patients with chronic Kidney disease because these patients have high mortality rate due cardiovascular disease or cerebrovascular disease.

Materials and Methods: This study was a cross sectional, observational and descriptive study done in tertiary health care hospital and teaching institute, study period was from December 2018 to December 2020. A total 60 cases were included in this study as per inclusion criteria and exclusion criteria.

Results: In the present study serum samples of 60 patients were studied to know the incidence of dyslipidemia in chronic kidney disease patients, the triglycerides, cholesterol, LDL and HDL values were measured and compared. The p values were found to be insignificant.

Conclusion: The mean values of the lipid profile showed a borderline elevation of serum triglycerides, Serum cholesterol, HDL and LDL values were within normal range. There was no statistically significant variation in the lipid profile of the patients when compared with the co-morbid conditions of diabetes mellitus and hypertension.

Keywords: Chronic Kidney Disease, Mortality, Dyslipidemia, Cardiovascular Disease, Cerebrovascular Disease.

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Introduction

Chronic kidney disease (CKD) is defined (by Kidney Disease Improving Global Outcomes) (KDIGO) [1] as abnormalities of kidney structure or function, which is present for more than 3 months, with

implications for health. Cardiovascular complications in CKD are major causes of morbidity and mortality among patients with chronic kidney disease. More than fifty percent of patients with chronic kidney disease succumb to death due to

cardiovascular diseases [2]. Now a days, hyperlipidemia has been considered as an important risk factor for cardiovascular and cerebrovascular diseases, this has brought interest in the management and identification of dyslipidemias [3]. In CKD, decreased HDL concentration and hypertriglyceridemia were the most noticed dyslipidemias [4]. Due to Inappropriate activity of some key enzymes in lipoprotein metabolism and metabolic pathways which cause early stage of renal failure and results in dyslipidemia which is a risk factor for the development of atherosclerosis [5]. Patients with chronic kidney disease will have secondary form of dyslipidemia which is characterized by an increasing serum triglyceride with elevated VLDL, Small dense LDL particles and low HDL Cholesterol [6]. When there is Progressive kidney failure associated with proteinuria then such patients likely to have abnormalities of lipoprotein transport [7]. The patients fasting lipid profile was compared to the values by the National cholesterol education program extent panel on detection, evaluation and treatment of high blood cholesterol in Adults (NCEP-ATP III) [8].

Materials and Methods

The study was a cross sectional, observational and descriptive study done in tertiary health care hospital and teaching institute, This study was started after getting written and valid permission from institutional ethical committee. Patients coming to the hospital and diagnosed with chronic kidney Disease as per the diagnostic criteria for CKD by KDIGO (i.e. Albuminuria (AER \geq 30 mg/24 hours; ACR \geq 30 mg/g [\geq 3 mg/mmol]), Electrolyte and other abnormalities due to tubular disorders, abnormalities seen on Urine sediment, Abnormalities detected on histology, Structural abnormalities of kidney detected by imaging, History of kidney

transplantation, Decreased in GFR, GFR $<$ 60 ml/min/1.73 m² (GFR categories G3a–G5) ,Sixty patients of chronic kidney disease treated as outpatients or inpatients were included in the study after taking patients consent. study period was from December 2018 to December 2020. The cases were collected over a period of two years. The patients those who needed hemodialysis and those who did not were also included. Exclusion criteria were Patients with Acute renal failure, nephrotic syndrome, liver disease, Who are on drugs B blockers, hypolipidemic drugs and oral contraceptive pills, Pregnant female patients and age less than 12 years. The participant patients were interviewed for a detailed medical history including the presence of co-morbid conditions. They were examined for the presence of markers of hyperlipidemia like xanthelasma, tendon xanthomas and eruptive xanthomas. They were tested for serum lipid levels after fasting overnight. In the present study history of the onset of symptoms, duration of symptoms, Progression of all the symptoms, history of drug intake and dietary history was noted. These Patients were examined clinically for signs of hyperlipidemia. Important laboratory investigations like hemoglobin, total white cell count, urine examination, random blood sugar, fasting and postprandial blood sugar, serum urea level, serum creatinine concentration, serum electrolytes, estimated glomerular filtration rate, serum cholesterol, Serum triglyceride, serum low density lipoprotein, serum high density Lipoprotein ,other blood investigations as and when required and ultrasonography abdomen-pelvis for sizes of kidneys was done and No follow up was done.

Estimated glomerular filtration rate By using the Cockcroft Gault formula the glomerular filtration rate was calculated.

$$\text{GFR in males} = \frac{(140 - \text{age}) \times \text{body weight (kilograms)}}{72 \times \text{Sr. Creatinine}}$$

$$\text{GFR In females} = \frac{(140 - \text{age}) \times \text{body weight (kilograms)} \times 0.85}{72 \times \text{Sr. Creatinine}}$$

The patients fasting lipid profile was compared to the values by the National cholesterol education program extent panel on detection, evaluation and treatment of high blood cholesterol in Adults (NCEP-ATP III). Mean, standard deviation and confidence interval was calculated. To calculate the significance between Means, Student's t test was used.

$t = (M - \mu) / s / \sqrt{n}$, where, t = Student's t test, m = mean, s = standard deviation, n = variable set size.

Results

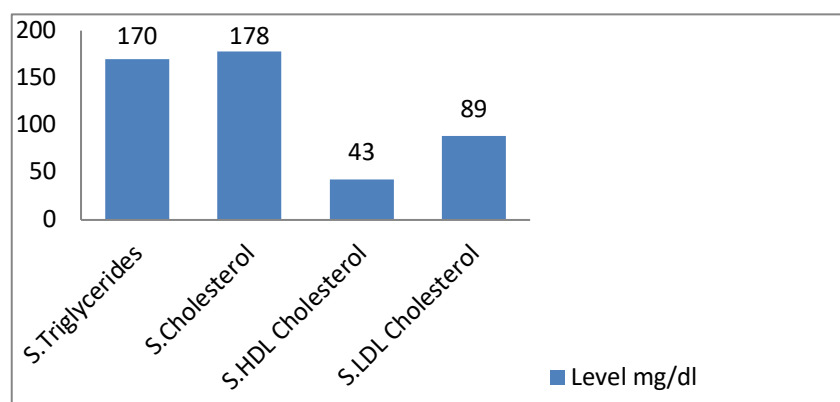
In the present study of 60 patients, dyslipidemia does not occur significantly in the study population (P -value <0.05). From results in this study its seen that the mean value of Serum cholesterol level was 178 mg/dl, Serum Triglycerides level was 170 mg/dl, Serum LDL level was 89 mg/dl and Serum HDL level was 43 mg/dl. They all were within normal range.

Discussion

This study shows that chronic kidney disease was commonly associated with dyslipidemia in the form of borderline high

triglyceride levels. Increase in the serum triglycerides level when compared by statistical analysis was not found to be significant. This study showed the lipoprotein fractions were statistically within the normal range. Among the 60 patients who were presented with chronic kidney disease 65% had diabetes, 68% were hypertensive, 48% were both diabetic and hypertensive and 60% were on hemodialysis.

Among all the patients, only 20% had skin markers of hyperlipidemia. The mean values of the lipid profile showed a borderline elevation of serum triglycerides, Serum cholesterol, HDL and LDL were within normal range, There was no statistically significant variation in the lipid profile of the patients when compared with the co-morbid conditions of diabetes mellitus and hypertension, There was no significant correlation the lipid profile and the skin markers of dyslipidemia, The lipid profile values were not found to vary among the patients who were on conservative management or on hemodialysis in this group.



Graph 1: Lipid profile values of patients of CKD under study.

Table 1: Gender wise distribution of cases and serum Lipid values.

Parameter	Sex	N (Number)	Mean	Std. Deviation
Serum Triglycerides (mg/dl)	Female	17	164.71	58.092
	Male	43	173.30	121.594
Serum Total Cholesterol	Female	17	182.65	45.678
	Male	43	176.93	40.616
Serum HDL Cholesterol	Female	17	50.47	13.852
	Male	43	41.28	13.888
Serum HDL Cholesterol	Female	17	89.65	33.160
	Male	43	89.84	37.022

Limitations

1. This study does not include a detailed dietary history.
2. It does not compare the caloric intake and the triglyceride levels.
3. The duration of CKD has not been mentioned
4. The stage of CKD has not been included.
5. The study group was small and heterogeneous.
6. Etiology of CKD has not been mentioned.
7. In the present study, sample size was only 60, study was stopped due to covid pandemic and available data was analysed. Small sample size could be the reason for statistically non-significant results in this study.

Conclusion

This study has found that the mean values of the lipid profile in sixty CKD patients only the triglycerides were elevated. However, the statistical analysis showed that it was not significant. This study however did not include a detailed dietary and caloric history. Also, the study group was heterogeneous.

Hence it would be beneficial to undertake the study after eliminating the limitations and also including a larger group.

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