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General Medicine

LIPID PROFILE ABNORMALITIES IN CKD

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ABSTRACT **Aim:** The present study was undertaken to explore the lipid profile abnormalities in CKD patients and their correlation with renal function and hemodialysis. **Material and methods:** This study was a hospital based cross sectional study conducted in M.L.B Medical College, Jhansi (U.P.). The study included CKD patients coming to OPD of General Medicine department as well as admitted patients. This study was conducted in 50 patients with CKD and 50 normal healthy persons. All the patients in this study group were selected from the Department of Medicine, M.L.B Medical College, Jhansi (U.P.), during May 2019–Sept. 2020. **Results:** In our study the most common lipid abnormalities in CKD were hypertriglyceridemia (56%) and low HDL (50%) along with a modest increase TC. As compared to controls, TC, TG were increased and HDL was decreased in patients of CKD and the difference was statistically significant ($p < 0.05$). In patients of CKD, patients on HD had lower TC, LDL and higher HDL as compared to patients on Conservative management and the difference was statistically significant. No significant correlation was found between renal function and lipid profile in patients of CKD. **Conclusion:** Patients of CKD have higher levels of Total Cholesterol, Triglycerides and a lower level of HDL as compared to Controls. However, no significant correlation could be demonstrated for renal function and lipid profile abnormalities in patients of CKD.

KEYWORDS : CKD, Hypertriglyceridemia, lipid profile.

INTRODUCTION

Chronic kidney disease (CKD) is a worldwide health problem, with a global prevalence of around 8%-16%[1-2]. CKD is associated with a high mortality and morbidity, high rates of hospitalization and rehospitilization, reduced quality of life and high healthcare costs related to both CKD itself and associated comorbidities.

AIMS AND OBJECTIVES

The aims of this study were as follows:

- To estimate various lipid profile abnormalities in CKD patients and normal healthy controls.
- To compare lipid profile in patients with CKD on conservative management and hemodialysis (HD).
- To study the correlation between renal function and lipid abnormalities in CKD.

MATERIALS AND METHODS

This study was a hospital based cross sectional study conducted in M.L.B Medical College, Jhansi (U.P.). The study included CKD and ARF patients coming to OPD of General Medicine department as well as admitted patients. This study was conducted in 50 patients with CKD 50 normal healthy persons. All the patients in this study group were selected from the Department of Medicine, M.L.B Medical College, Jhansi (U.P.), during May 2019–Sept. 2020.

The study was conducted after obtaining permission from the Institutional ethics committee. All patients were enrolled after taking informed consent and the identity of the patients would not be revealed.

Location and period of study:

The study was carried out in the Department of Medicine, M.L.B. Medical College, Jhansi (U.P.) from May. 2019 to Oct 2020.

Study design

This was a cross-sectional observational study.

Inclusion Criteria for Patients

Patients fulfilling the following criteria were included as patients in the study:

1. Patients between age group of 18 and 85 years with established CKD.
2. Patients who were on conservative or dialysis treatment for CKD.
3. Established renal failure was ensured by radiological evidence or biochemical evidence.

Inclusion criteria for controls

- Normal healthy person who were age and sex related to patients will be included as controls.

Exclusion criteria

The following criteria were excluded from the study:

- Those who were on drugs affecting lipid metabolism such as β-blockers, statins, and oral contraceptive pills.
- Female patients who were pregnant.
- Patients of nephrotic syndrome.

Patients and controls included in the study were matched according to age and the results was analyzed by SPSS software 21.0.

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.

Statistical analysis

Statistical analysis was performed using 21.0 (SPSS. Inc., Chichago.IL). Student t test, Fisher exact test and ANOVA test were used as appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

- Out of 50 cases of CKD, 35 (70%) were males and 15 (30%) were females.
- Out of 50 Controls, 31 (62%) were males and 19 (38%) were females.
- The mean age of patients was
  - CKD- 47.28 yrs
  - Control- 44.86 yrs
- The distribution of BMI was: (Mean ± SD):
  - CKD- 22.75 ±3.14
  - Control- 22.09 ±1.96
- Mean S Creatinine in CKD patients was 7 ±4.99

- Mean value of Total cholesterol was 169.82 ±27.43 in CKD pts and 150.08 ±15.67 in controls.
- Mean value of Triglycerides was 155.82 ±47.14 in CKD pts and 140.16 ±14.70 in controls.
- Mean value of LDL was 83.68 ±25.76 in CKD pts and 85.72 ±8.71 in controls.
- Mean value of HDL was 38.04 ±4.92 in CKD pts and 50.56 ±7.12 in controls.

Table 1: Age

Age (in years)	CKD [N=50]		Control [N=50]	
	No	%	No	%
18-30	6	12.00%	7	14.00%
31-45	18	36.00%	27	54.00%
46-60	20	40.00%	16	32.00%
61-75	6	12.00%	0	0.00%
>75	0	0.00%	0	0.00%
Mean Age	47.28		44.86	

Table 2: Sex

Sex	CKD [N=50]		Control [N=50]	
	No	%	No	%
Male	35	70.00%	31	62.00%
Female	15	30.00%	19	38.00%

Table 3: Hemodialysis versus Conservative Management in CKD patients

CKD (n=50)	No	%
HD	39	78.00%
Conservative	11	22.00%

Table 4: BMI

BMI	CKD [N=50]		Control [N=50]	
	No	%	No	%
Underweight (<18.5)	4	8.00%	1	2.00%
Healthy weight (18.5-24.9)	38	76.00%	44	88.00%
Overweight (25.0-29.9)	7	14.00%	5	10.00%
Obesity (30.0-34.9)	1	2.00%	0	0.00%
Obesity (35.0-39.9)	0	0.00%	0	0.00%
Extreme obesity (>40)	0	0.00%	0	0.00%
Mean	22.75 ±3.14		22.09 ±1.96	

Table 5: Risk factors for Dyslipidemia in CKD patients

Risk factors	CKD [N=50]		Controls [N=50]	
DM	17	34%	8	16%
HTN	27	54%	6	12%
Smoking	16	32%	77	14%
Alcohol	3	6%	3	6%

Table 6: Severity of CKD by eGFR

eGFR (in ml/min/1.73m^2	CKD [N=50]	
	No	%
<15	32	64.00%
15-29	7	14.00%
30-59	11	22.00%

Table 7: Type of lipid disorders in CKD patients

Type of lipid disorders	CKD [N=50]		Control [N=50]	
	No	%	No	%
Elevated total cholesterol	5	10.00%	2	4.00%
Elevated triglycerides	28	56.00%	11	22.00%
Increased LDL cholesterol	10	20.00%	2	4.00%
Decreased HDL cholesterol	25	50.00%	7	14.00%

Table 8: Comparison between lipid profiles in patients of CKD and Controls

	CKD (n=50) (Mean±SD)	Controls (n=50) (Mean±SD)	p value
TC	169.82 ±27.43	150.08 ±15.67	0.0001
TG	155.82 ±47.14	140.16 ±14.70	0.0272
LDL	83.68 ±25.76	85.72 ±8.71	0.5969
HDL	38.04 ±4.92	50.56 ±7.12	0.0001

Table 9: Comparison of lipid profile in CKD patients on HD vs Conservative Management

Treatment	TC	TG	LDL	HDL
HD (n=39)	163.61 ±20.71	153.76 ±51.59	76.97 ±19.7	39.23 ±4.56
Conservative (n=11)	183.36 ±38.56	163.09 ±26.36	107.45 ±31.27	33.81 ±3.81
P value	0.0277	0.5674	0.0003	0.0008

Table 10: Correlation between renal function and lipid profile in patients of CKD

eGFR (ml/min/1.73 m^2)	TC	TG	LDL	HDL
<15	165.88 ±21.19	159.25 ±55.07	78.44 ±20.79	38.5 ±4.60
15-29	156.14 ±15.27	134.71 ±23.88	71.43 ±12.14	41.43 ±3.91
30-59	167.55 ±40.35	159.27 ±27.93	80.73 ±32.33	37.82 ±3.81
p value	0.0670434	0.451137	0.32814	0.060119

DISCUSSION

This study was conducted to determine the lipid profile changes in CKD patients on conservative management and regular haemodialysis and compare them with normal healthy controls.

The study population was 100 of which 50 were patients of CKD and 50 were controls. They were selected as per inclusion criteria.

In our study most common lipid abnormalities in CKD were hypertriglyceridemia (56%) (p= 0.0272) and low HDL (50%) (p=0.0001) along with a modest increase in LDL (p=0.5969) and TC (p=0.0001).

Decreased HDL levels.

The low HDL level in patients with CKD in our study were consistent with **Diana M Lee LG et al**[3] who studied the lipid profile in CRF patients. This low HDL cholesterol was also an independent risk factor for development of CKD in Framingham off spring study.

Several mechanisms may underlie the reduction in HDL-Cholesterol where there is usually an indication of impaired inverse cholesterol transport [i.e transport of cholesterol from extrahepatic tissue to liver for its degeneration].

APO AI which is the activator of Lecithin–cholesterol acyltransferase (LCAT) is reduced in CKD due to down regulation of hepatic Apo AI genes, leading to decline in the activity of LACT, which causes reduced cholesterol esterification and impaired HDL maturation. The activity of LACT is consistently diminished in CKD, so there is decrease in HDL levels.

In **MDRD** study (Modification of diet in renal disease study)[4] low HDL level in CKD patients were one of the independent risk factor for progression of kidney disease. In our study the mean value was significantly less than the age matched healthy controls.

Elevated Triglycerides:

Triglycerides levels were significantly elevated in our study than control group. Abnormal triglyceride values were found in 56% of patients in our study (p= 0.072).

The present study demonstrates that CRF was commonly accompanied by lipid abnormality in the form of hypertriglyceridemia.

This is similar to the observations made in western studies and recent Indian studies by **Gupta et al**[15], **Das et al**[16], **Bagdade and chan et al**[17] .

Chan MK et al. (1981)[17] also found hypertriglycredemia was the major abnormality in their study. Hypertriglycredemia represents an early feature of renal failure.

Elevated LDL

LDL was not significantly elevated than that of controls in our study (p= 0.6802).

Most studies find that uremic patients usually have normal or slightly reduced concentration of LDL-C and they exhibit important disturbance in the density distribution of LDL sub fraction that is characterized by a predominance of small LDL particles.

This observation is similar to the studies of **Lee et al (2002)**[3] in an article published in archives of internal medicine. However, in most

studies uremic patient usually have a normal or slightly reduced concentration of LDL-C level as they exhibit important disturbance in the density distribution of LDL subfraction that is characterized by a predominance of small dense LDL particles.

Elevated TC

TC levels were significantly elevated in our study (10% of patients, p= 0.0001). Similar results were observed in the study by **Lee et al**[3].

K Rajani Kumari et al (2018)[8] conducted a cross sectional observational study about lipid profile abnormality in CKD patients on conservative and hemodialysis management compared with healthy controls. There was statistically significant decrease in HDL and increase in low density lipoprotein (LDL), and total cholesterol levels when compared with normal healthy controls. There was a negative correlation between serum creatinine and HDL levels. Among CKD patients there was significant decrease in HDL and increase in LDL level in both conservative and hemodialysis group. Decrease in HDL was more in conservative management group and increase in TG was more in hemodialysis group. .

Similar results were observed in our study except in our study HDL was decreased in the conservative group. This effect was probably due to the fact that patients on conservative management group were older, obese and hypertensive.

CONCLUSIONS

- Patients of CKD display a distinct pattern of lipid abnormalities.
- TC, TG were significantly increased and HDL was significantly decreased in patients of CKD as compared to healthy controls.
- In patients of CKD, patients on HD had lower TC, LDL and higher HDL as compared to patients on Conservative management and the difference was statistically significant.
- No significant correlation was found between renal function and lipid profile in patients of CKD.
- The observed pattern of lipid abnormalities needs to be studied in larger prospective observational study to assess whether this pattern of dyslipidemia is significantly associated with higher risk for adverse Cardiovascular events.

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