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ORIGINAL RESEARCH

A Study of Lipid Profile in Non-Diabetic Chronic kidney disease patients: A Hospital Based Study

Sachinkumar K Khade[1], Anita S Bhosale[2], Bhagyashri B Lahane[3],

[1,2]Assistant Professor, [3]Senior Resident Department of Medicine, MIMER Medical College Talegaon Dt Pune, Maharashtra India

Corresponding Author: Dr.Bhagyashri B Lahane, Senior Resident Department of General Medicine, MIMER Medical College, Talegaon, Dt- Pune, Maharashtra India 410506, madhurilahane22@gmail.com, 7038555397

ABSTRACT

Background: The silent epidemic of the twenty-first century is chronic kidney disease (CKD). According to surveys, CKD affects up to 16 percent of the adult population. It doesn't just happen in rich countries; it happens everywhere. In India, about one lakh people are diagnosed with CKD each year, necessitating a kidney transplant or lifelong dialysis. **Objectives:** to determine the prevalence of changes in different lipoprotein levels in non-diabetic chronic renal disease patients**Materials and Methods:** A prospective observational study was conducted in Non-diabetic CKD patients, admitted at in the Medicine ward and ICU under Medicine Department of our hospital and duration of study was 18 months which included a total of 52 patients.**Results:**Prevalence of dyslipidaemia was seen in almost three fourth (73.1%) of the cases with chronic kidney disease. Dyslipidaemia was seen in 64.3% cases of CKD stage III, 78.6% in stage IV and 90% in CKD stage V respectively($p<0.01$). Raised cholesterol was seen in 14.3% cases of CKD stage III, 42.9% in stage IV and 80% in CKD stage V respectively($p<0.01$). **Conclusion:** Study concluded that prevalence of dyslipidaemia in non-diabetic CKD is high. EverythreeoutoffourCKDcasesweresufferingfromdyslipidaemia,especiallyraised LDL and low HDL levels.**Keywords:** *Lipid Profile, Non-Diabetic, Chronic kidney disease patients,* dyslipidaemia

Introduction:A decrease in glomerular filtration rate (less than 60 ml /min for three months or more) and histological evidence of nephron population reduction describe chronic kidney disease. The clinical course is usually marked by a steady decline of nephron function, eventually leading to end-stage renal disease. End stage renal disease (ESRD) is characterized by hypertension, anemia, renal bone disease, nutritional impairment, neuropathy, impaired quality of life, and reduced life expectancy [1]. There are multiple causes of kidney injury that lead to the final common pathway of End stage renal disease (ESRD). Lipoprotein metabolism is significantly changed in patients with impaired renal function [2]. Lipid abnormalities were once thought to represent consequences of ESRD, however they can appear in the early stages of CKD [3]. Factors such as nephrotic range proteinuria, diabetes mellitus, genetic lipid metabolism disorders, and steroid intake can all affect the type of dyslipidemia [3]. The activity of lipoprotein lipase and hepatic triglyceride lipase is reduced in patients with CKD. This prevents the liver and peripheral tissue from absorbing triglyceride-rich, apolipoprotein B-containing lipoproteins, resulting in increased circulation of these atherogenic lipoproteins [4]. Disturbances in lipoprotein metabolism can be seen even in the early stages of CKD, and they usually progress in lockstep with the decline in renal function [5]. In patients with renal failure, severe lipid metabolism issues develop, and the lipidmetabolism disorder unique to this patient group is known as uremic dyslipidemia [5], which can hasten the progression of the disease [6].

Hypertriglyceridemia, an increase in triglyceride remnant Lp (a), an increase in very-low-density lipoprotein (VLDL), a decrease in high-density lipoprotein (HDL), total cholesterol (TC), and low-density lipoprotein (LDL) are all abnormal lipid profiles in CKD patients, except in nephrotic syndrome patients [7]. The diagnosis and management of abnormalities in plasma lipids and lipoproteins has sparked interest since dyslipidemia is a major risk factor for coronary heart disease [8].

Hyperlipidemia appears to hasten the progression of glomerulosclerosis and tubulointerstitial disease in experimental studies [9]. There is now mounting evidence that changes in lipid metabolism may play a role in the course of renal disease [10]. Renal damage can be reduced and renal function preserved with lipid-lowering therapy [11]. The triglyceride-rich apoB-containing lipoproteins have been linked to a faster degradation of renal function, although the pathophysiological mechanism is yet unknown.

Because plasma lipids have a role in the etiology of atherosclerosis and ischemic heart disease, it's important to look at the behavior of different lipid fractions in CKD patients. Research of the dyslipidemia risk posed by CKD in non-diabetic people was indicated in light of the limited literature available in the Indian population, thereby explaining the independent influence of CKD on dyslipidemia. This will aid in the development of a therapy regimen for the management of both obvious and eminent dyslipidemia in CKD patients.

Thus, the goal of the current investigation was to determine the prevalence of changes in different lipoprotein levels in non-diabetic chronic renal disease patients.

MATERIALS & METHODS

A prospective observational study was conducted in Non-diabetic CKD patients, admitted at in the Medicine ward and ICU under Medicine Department of our hospital and duration of study was 18 months which included a total of 52 patients. Permission for the study was obtained from the College authorities prior to commencement.

Inclusion Criteria

1. Patients Diagnosed of CKD for a duration of more than 6 months.

2. Patients with CKD stage 3, 4 and 5 as per KIDGO classification.

3. Patients who have given consent for the study

Exclusion Criteria:

1. Patients below the age of 20 yrs.

2. Patients with Diabetes Mellitus.

3. Patients with CKD stage 1 or 2

Methodology: Detail medical history and relevant data and Informed consent was obtained from all subjects. All selected patients were inquired about detailed history regarding duration of CKD, treatment received for the same. Required biochemical evaluation was done.

The stages of CKD were referenced from kidney disease improving global outcome (KDIGO) guidelines. **CKD** is defined as the presence, for at least 3 months, of evidence of kidney damage with an abnormal GFR or alternatively, by a GFR<60 ml/min/1.73m2 BSA [12]. GFR was calculated using

CKD-EPI equation:

GFR = 141x min (serum creat/Kappa,1) alpha x max (serum creat/Kappa,1) -1.209 x 0.993 age x sex x Race

CKD staging [12]

CKD stage	GFR (ml/min/1.73m^2)
1	>90
2	60-89
3a	45-59
3b	30-44
4	15-29
5	<15

Samples for lipid profile were collected after an overnight fast in a 5 ml syringe. After collection, the sample was allowed to clot for half hour and then the serum was analysed for lipid profile using commercially available kits on fully automated analyser in the biochemistry laboratory.

Statistical Analysis

All the data was noted down in a pre-designed study proforma. Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by Chi-Square test. Quantitative data was represented using Mean ± SD. Analysis of Quantitative data between the two groups was done using unpaired t-test if data passed 'Normality test' and by Mann-Whitney Test if data failed 'Normality test'. A p-value < 0.05 was taken as level of significance. Results were graphically represented where deemed necessary. SPSS Version 21.0 was used for most analysis and Microsoft Excel 2010 for graphical representation.

RESULTS: Mean age of the CKD cases was 63.83years with over half(63.5%)of the cases were elderly i.e., above 60 years ofage. Equal gender distribution was observed among cases of CKD in present study (50% males and females). Most common aetiology of CKD in present study was hypertension (57.7%) followed by acute glomerulonephritis (26.9%) and interstitial nephritis (15.4%).

Out of the total 90 patients of CKD, 53.8% were in stage IIII while 26.9% and 19.2% were in stage IV and V respectively.

Table 1. Distribution of study cases as per CKD stage

CKD Stage	N	%
III	28	53.8%
IV	14	26.9%
V	10	19.2%
Total	52	100.0%

Amonglipidprofileparameters,raisedLDLwasthemostcommonderangementseen in CKD cases (59.6%) followed by low HDL (34.6%), raised Triglycerides and total cholesterol (36.5% and 34.6%respectively).

Table 2. Distribution of study cases as per lipid profile abnormalities

Lipid Profile	N	%
Raised TC	18	34.6%
Raised TGs	19	36.5%

Raised LDL	31	59.6%
Low HDL	18	34.6%

Prevalenceofdyslipidaemiawasseeninalmostthreefourth(73.1%)ofthecaseswith chronic kidneydisease.

Table 3. Distribution of study cases as per dyslipidaemia

Dyslipidaemia	N	%
No	14	26.9%
Yes	38	73.1%
Total	52	100.0%

Dyslipidaemia was seen in 64.3% cases of CKD stage III, 78.6% in stage IV and 90% in CKD stage V respectively (p<0.01).

Table 4. Association of CKD stage with dyslipidaemia

CKD Stage	Dyslipidaemia		Total
	No	Yes	
III	10	18	28
	35.7%	64.3%	100.0%
IV	3	11	14
	21.4%	78.6%	100.0%
V	1	9	10
	10.0%	90.0%	100.0%
Total	14	38	52
	26.9%	73.1%	100.0%
p- value <0.01			

Mean Total cholesterol and triglyceride levels were observed to be significantly increasing with progression in CKD i.e., increasing stage of CKD while mean HDL levels were observed to be significantly decreasing with CKD progression (p<0.01).

Table 5. Mean lipid profile parameters with staging of CKD

CKD Stage		Lipid Profile			
		TC	TG	LDL	HDL
III	Mean	179.6	147.0	106.1	43.5
	SD	42.8	49.3	27.8	6.9
IV	Mean	191.0	152.2	114.3	42.0
	SD	37.0	85.0	34.8	9.9
V	Mean	199.7	164.5	122.3	35.6
	SD	52.8	79.0	46.2	7.4
p-value		<0.01	<0.01	0.09	<0.01

DISCUSSION

Our findings regarding average age of the CKD patients are consistent with those of Rajapurkar et al. [13] The average age of the CKD patients in their study was 60.1 14.6 years, with men accounting for 60.3 percent of the participants. The Screening and Early Evaluation of Kidney Disease (SEEK) study was carried out by Singh et al. [14]. The total number of subjects participating in this study is 5588. All participants were 55.22 15.2 years old on average (range 18-98 years), with 55.1 percent of men and 44.9 percent of females. The majority of patients (23%) in the Lahariya D et al. [15] study are between the ages of 51 and 60, with 56 percent males and 44 percent females. The Malyaban akis et al. [16] study included 155 chronic renal disease patients, 62.6 percent of them were men and the remaining 37.4% were women.

Hypertension was the most common cause of CKD in this study (57.7%), followed by acute glomerulonephritis (26.7%) and interstitial nephritis (26.7%), (15.4 %). Hypertension was also shown to be the most common cause in 61.4 percent of CKD cases, followed by diabetes in 47.3 percent of cases, according to Jacob SR et al. [17].

In the current investigation, dyslipidaemia was found in nearly three-quarters (73.1%) of the subjects with chronic renal disease. Malyaban akis et al. [16] discovered an aberrant lipid profile in 95 patients (61.3 percent) out of a total of 155. In 32.9 percent of patients, total cholesterol was elevated, hypertriglyceridemia was present in 53.5 percent, and 23.2 percent had low HDL. 68.70 percent of non-diabetic CKD patients in the research group exhibited

dyslipidaemia with any of the indices, according to Behera BP et al. [18]. The mean serum cholesterol concentration was 164.0447.85 mg/dl, with a range of 44 to 323 mg/dl. Hypercholesterolemia was found in 19.61 percent of the patients. The mean blood triglyceride concentration was 147.1669.40 mg/dl, with a range of 41 to 467 mg/dl. Hypertriglyceridemia was seen in 37.40 percent of the patients. The mean blood HDL concentration was 51.5016.72 mg/dl, with a range of 4 to 126 mg/dl. HDL levels were < 40 mg/dl in 21.37 percent of the research participants. The mean serum LDL concentration was 91.4131.24 mg/dl, with a range of 12 to 203 mg/dl. LDL levels were higher in 11.07 percent of the research participants. The frequency of dyslipidaemia in non-DM CKD sufferers was found to be 78.67 percent by Murmu AP al. [19].

Dyslipidaemia is a common consequence of CKD and changes in lipoprotein metabolism that is linked to a decrease in GFR; hence, lipid profile is influenced by renal function and proteinuria. Dyslipidaemia was found in 64.3 percent of cases of CKD stage III, 78.6 percent of cases of CKD stage IV, and 90 percent of cases of CKD stage V in this study (p0.01). Mean total cholesterol and triglyceride levels were found to be considerably higher as the stage of CKD progressed (p0.01), whereas mean HDL levels were found to be significantly lower as the stage of CKD progressed (p0.01). The lipid profile exhibited a high connection with GFR, according to Lahariya D et al. [15]. Triglycerides had the strongest association (r=-0.543, p=0.001). The level of triglycerides rises as GFR falls. Apart from that, total cholesterol (r=-0.275, p=0.001), LDL (r=-0.427, p=0.001), and VLDL (r=-0.476, p=0.001) all have a negative connection with GFR, although HDL (r=0.268, p=0.001) has a positive correlation, indicating that as GFR decreases, HDL levels decrease as well. Malyaban das et al. [16] also found that dyslipidemia increased with stage of chronic kidney disease, with 21.4 percent of stage 2 patients having abnormal lipid profiles, 62.2 percent of stage 4 patients having abnormal lipid profiles, and 75.6 percent of stage 5 patients having abnormal lipid profiles. The link between aberrant lipid profiles and chronic renal disease stage was discovered to be statistically significant (p value 0.001). When comparing dyslipidaemia to CKD staging, Murmu AP et al. [19] discovered that lipid abnormalities was 75 percent, 73 percent, and 81.7 percent in Stage III, IV, and V, respectively. In Stage V, the most common anomaly was decreased HDL, which was identified in 65.59 percent of patients. In the Stage III and Stage IV populations, HDL levels dropped by 50% and 48.64 percent, respectively. Increased TG levels were found to be 45 percent, 32.43 percent, and 60.21 percent in Stages III, IV, and V, respectively. In this study, there was no statistically significant (p=0.55) rise in LDL levels in association to increased CKD severity. Behera BP et al. [18] discovered a link between eGFR and lipid profile markers. HDL (r= 0.1962, p0.01) showed statistical significance when e-GFR was correlated with several parameters. With lowering e-GFR, there was a significant increase in total cholesterol, triglycerides, LDL, and a decrease in HDL.

The fact that more patients in stages 4 and 5 had aberrant lipid profiles than patients in other stages could be explained by the fact that most patients in stage 5 were on dialysis and had had chronic renal disease for a long time. Furthermore, dyslipidaemias have been observed to develop early in the course of chronic kidney disease but progress rapidly as the stage of chronic kidney disease increases [20], explaining our observation that patients with stage 5 chronic kidney disease have a higher prevalence of abnormal lipid profiles.

CONCLUSION

It is concluded that dyslipidaemia is common in non-diabetic CKD patients. Dyslipidaemia was found in three out of four CKD patients, with elevated LDL and low HDL levels in particular. Lipid parameters and disease progression have a high degree of connection, which is statistically significant for cholesterol, triglyceride, and HDL levels.

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