Study of Lipid Profile in Chronic Kidney Disease Patients in RIMS Hospital

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Abstract:*Cardiovascular disease is a major cause of morbidity and mortality among patients with Chronic kidney disease.Majority of patients die from cardiovascular system complications. Dyslipidemia is a major risk factor for coronary heart disease.Many epidemiological studies have shown that CKD is associated with dyslipidemia. Our aim was to study Lipid profile in 100 patients of chronic kidney disease who were admitted in the Medicine Department of Regional Institute of Medical Sciences Hospital, Imphalfrom January 2016 to December 2016.Lipid examination showed 7% patients having high cholesterol (>240mg/dl) and hypertriglyceridemia was seen in 23% patients. Maximum number of patients (39.1%) with diabetic nephropathy had hypertriglyceridemia. LDL cholesterol was found to high in 10 % of patients and 55% patients had low HDL cholesterol level.*

I.   Introduction

        Chronic kidney disease is a conditions that affect the kidney, with the potential to cause either progressive loss of kidney function or complications resulting from decreased kidney function for duration of three months or more, irrespective of diagnosis[1]. Cardiovascular disease is a major cause of morbidity and mortality among patients with CKD.[23,4]Majority of patients die from cardiovascular system complications. The growing recognition that dyslipidemia is a major risk factor for coronary heart disease has prompted interest in the identification and management of abnormalities in plasma lipids and lipoproteins. The association between renal disease and hyperlipidemia has been known for more than 100 yrs. The association between hyperlipidemia and cardiovascular disease is now well accepted.[5,6]Lipid abnormalities are characterized by a moderate hypertriglyceridemia and normal total cholesterol, profound alterations of lipoprotein profile and lipoprotein composition are frequently encountered including elevated apolipoprotein B containing triglyceride rich lipoproteins like Very low density lipoprotein (VLDL) and Intermediate density lipoprotein (IDL). Low levels of plasma apolipoprotein A1 and High-density lipoprotein (HDL) affecting the reverse cholesterol transport. In addition to these quantitative alterations, an increase in small dense LDL subfraction has been found. Also there are reports available regarding accelerated atherosclerosis in Chronic Kidney Disease due to altered lipid metabolism. In recent years, the levels of high-density lipoproteins have gained importance in view of the fact that increasing reports are available incriminating decreased HDL levels as one of risk factors for cardiovascular disease.[7,8,9] Cardiovascular diseases in Chronic Kidney Disease is treatable and potentially preventable. This study was designed to evaluate the lipid profile in Chronic Kidney Disease patient in RIMS Hospital, Imphal.

II.   Materials And Methods

1.**Study design**: Cross sectional study
2.**Setting**: Department of Medicine, Regional Institute of Medical Sciences, Imphal, India.
3.**Duration of Study**: January2016 to December 2016.
4.**Study population**:Chronic Kidney Disease patients.
5.**Inclusion criteria**:Patients of Chronic Kidney Disease as defined by National kidney foundation[1]
6. **Exclusion criteria**:   a) Patients on lipid lowering drugs
b) Patients with history of alcohol consumption
c) Patients with liver disease
d) Patients with Nephrotic syndrome
e) Patients on medication likely to affect lipid function
f) Pregnancy.

7.**Sample size** :A minimum of 100 CKD patients admitted in the Medicine ward ,, Regional Institute of Medical Sciences within the period fromJanuary 2016 to December 2016 were included in the study.

Methodology:

Patients were recruited after fulfilment of inclusion and exclusion criteria and after taking written informed consent. All the selected patients were subjected to detailed history and complete physical examination and data collected were noted in a pre-designed proforma. HDL cholesterol estimation was done by enzymatic determination of cholesterol in HDL fraction prepared by precipitation technique by Steele B W et al[10].Triglyceride estimation was done by methods adopted by Bucole G and Harold D[11].Total cholesterol estimation was estimated by enzymatic methods of Allain CC et al[12].LDL and VLDL cholesterol was calculated indirectly by using the formula of Fredickson DS et al[13]. All routine investigations and other relevant investigations needed for the study were also done. Other physical examination like height and weight a were taken and BMI of each patient were calculated.Statistical analysis of all the data was done by using SPSS 20 software. Chi square test, Pearson's correlation coefficient and T test were used wherever applicable.The study was approved by Institutional Ethics committee.

III. Results

Out of the 100 patients of CKD included in the study, the most common cause of CKD was Diabetic Nephropathy and Chronic Glomerulonephritis(CGN) followed by Obstructive Uropathy,Lupus nephritis(LN) and Autosomal dominant polycystic kidney disease (ADPKD). The mean age of the patients ranged from 21 to 77 years (mean age 50.38±14.91 yrs.). There were 62(62%) males and 38(38%) females.The total duration of disease ranged from 1 to 20 years (mean=4.85±3.51 yrs.).Most patients (34%) had disease duration ranging between 4 to 5 years.The body mass index ranged from 13.04kg/m^2 to 30.50kg/m^2 with a mean of 21.68 ± 3.34kg/m^2. Most of the patients (70%) are in normal BMI range.

Total cholesterol: The serum cholesterol ranged from 72-312 mg/dl (mean 162.8±49.4mg/dl).7 (7%) patients in the study had high cholesterol(>240mg/dl),9(9%) patients had borderline high cholesterol(200-239mg%) and 84(84%) patients had desirable cholesterol(<200 mg%).Amongst the causes of CKD, maximum numbers of lupus nephritis patients had cholesterol of >240mg/dl..(Figure 1&Table 1).
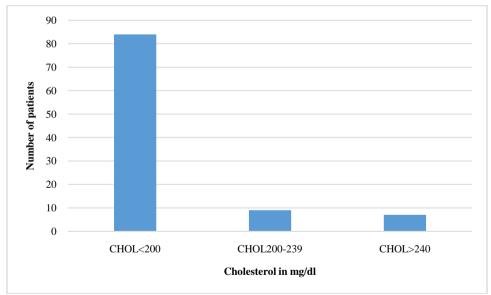

Figure 1

Table 1: Showing relation between level of total cholesterol and etiology of CKD.

Parameter	Diabeticnephropathy	Obstructive uropathy	CGN	ADPKD	LN	Total
Desirable cholesterol (<200mg%)	30 (85.7%)	18 (78.3%)	31 (88.6%)	1 (100%)	4 (66.6%)	84
Borderline High cholesterol(200-239mg%)	3 (8.5%)	3 (13%)	2 (5.7%)	0	1 (16.7%)	9
High cholesterol (>240mg%)	2 (5.9%)	2 (8.7%)	2 (5.7%)	0	1 (16.7%)	7

	35	23	35	1	6	100

Triglyceride: The serum triglyceride level ranged from 44-275 mg/dl (mean 118.77±42.96). Hypertriglyceridemia (Triclyceride>150mg/dl) was observed in 23 patients and 77 patients had normal desirable triglyceride level. (Figure 2& Table 2). Higher percentage of patients with Lupus nephritis (33.3%) and diabetic nephropathy (25.7%) had hypertriglyceridemia.
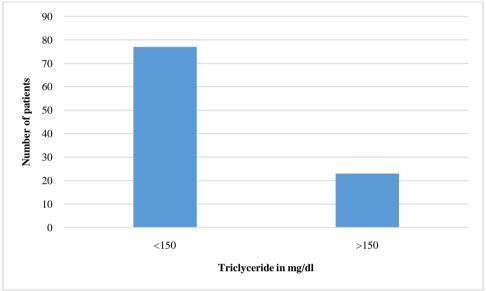

Figure 2

Table 2 : Showing relation between level of Triglyceride and etiology of CKD.

Parameter	Diabetic nephro	Obst. uopathy	CGN	ADPKD	LN	Total
Tg <150mg/dl	26 (74.3%)	19 (82.6%)	27 (77.1%)	1 (100%)	4 (66.6%)	77
Tg >150mg/dl	9 (25.7%)	4 (17.4%)	8 (22.9%)	0	2 (33.3%)	23
	35	23	35	1	6	100

LDL cholesterol: The LDL cholesterol ranged from 22-263 mg/dl(mean 98.66±45.96 mg/dl).Most of the patients (46) in the study had LDL-cholesterol below 100 mg/dl. (Figure 3&Table 3).
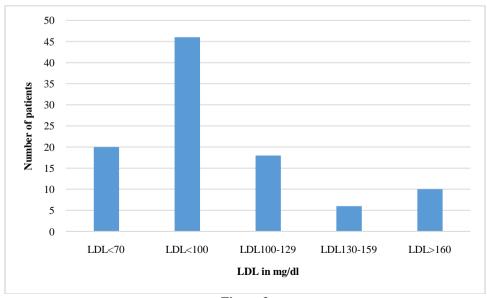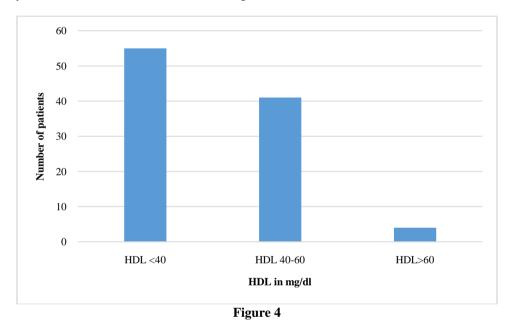

Figure 3

Table 3 : Showing relation between level of LDL cholesterol and etiology of CKD.

Parameter	Diabetic nephro	Obs. uropathy	CGN	ADPKD	LN	Total
LDL<70	6 (17.2%)	7 (30.6%)	7 (20%)	0	0	20
LDL<100	19 (54.2%)	8 (35%)	17 (48.6%)	0	2 (33.3%)	46
LDL 100-129	6 (17.2%)	2 (8.7%)	7 (20%)	1 (100%)	2 (33.3%)	18
LDL 130-159	2 (5.7%)	2 (8.7%)	2 (5.7%)	0	0	6
LDL>160	2 (5.7%)	4 (17%)	2 (5.7%)	0	2 (33.3%)	10
Total	35	23	35	1	6	100

HDL cholesterol: The HDL-Cholesterol ranged from 16-65 mg/dl (mean 38.83±10.93mg/dl).Most of the patients (55) had HDL level below 40 mg/dl.(Figure 4& Table 4) .Maximum number of patients with diabetic nephropathy had low HDL-cholesterol level of <40mg/dl.

Figure 4

Table 4: Showing relation between level of HDL cholesterol and etiology of CKD.

Parameter	Diabetic nephro	Obst. uropathy	CGN	ADPKD	LN	Total
HDL <40 mg/dl	22 (62.9%)	12 (52.2%)	16 (45.7%)	0	5 (83.3%)	55
HDL 40- 60 mg/dl	12 (34.3%)	10 (43.5%)	17 (48.6%)	1 (100%)	1 (16.7%)	41
HDL >60 mg/dl	1 (2.8%)	1 (4.3%)	2 (5.7%)	0	0	4
	35	23	35	1	6	100

IV.   Discussion
In this study a total of 100 patients of CKD irrespective of cause, duration and stages were included. Diabetic nephropathy (35%) and Chronic glomerulonephritis (35%) was the commonest cause of CKD.Avasthi G et al[14], studied 30 patients of CKD and they found that Chronic glomerulonephritis (30%) was the commonest cause followed by Obstructive uropathy (6%) . According to third annual report of CKD registry of India by Indian society of Nephrology[15], the commonest cause of CKD was diabetic nephropathy (30%),followed by undetermined cause (15.6%).The commonest cause of CKD in India was Chronic glomerulonephritis as shown in a study by Mittal S etal[16].Our study conclude that diabetic nephropathy and Chronic glomerulonephritis was the commonest cause of CKD which was in accordance with other studies.

Total cholesterol: In our study, serum cholesterol ranged from 72-312 mg/dl (mean 162.8±49.4mg/dl).7(7%) patients in the study had high cholesterol(>240mg/dl) ,9(9%) patients had borderline high cholesterol (200-239mg%) and 84(84%) patients had desirable cholesterol(<200 mg%).There was no significant difference in the serum cholesterol among the different groups. AttmanP.O[17]et al in their study showed no significant change in levels of total cholesterol. Quasctining T et al[18]reported combined hyperlipidemia (elevated total cholesterol and triglycerides in their study. AvramM et al[19] reported that CAPD patients have more atherogenic lipoprotein profiles than HD patients. WashioM et al[20] studied the effect of hyperlipidemia on the progression of chronic renal failure and suggested that hypercholesterolemia may be an independent aggravating factor in the progression of renal dysfunction in chronic renal failure patient.Tsumura et al[21] showed that the concentration of total cholesterol increases significantly as compared to control in chronic renal failure patients.

Triclyceride: In our study serum triglyceride level ranged from 44-275 mg/dl(mean 118.77±42.96). Hypertrigyceridemia was observed in 23(23%) patients and 77(77%) patients had normal desirable triglyceride level. Maximum number of patients with diabetic nephropathy 9 (39.1%) had hypertriglyceridemia. However, it was not statistically significant. Attman P.O et al [17] in their study stated that hypertriglyceridemia is the most common plasma lipid abnormality in patients of chronic renal failure. The cause for hypertriglyceridemia in chronic renal failure patients has not been clearly delineated. Available data derived from Kinetic studies have demonstrated that reduced catabolism of triglycerides is the predominant defect due to deficiency of lipoprotein lipase or hepatic triglyceride lipase or both. QuaschningT et al[18]reported that combined hyperlipidemia (elevated cholesterol and triglycerides) with low HDL cholesterol reflects more atherogenic condition. Samuelsson O et al[22] in their study showed that total cholesterol, low-density lipo- protein (LDL) cholesterol, and apolipoprotein B(ApoB) were found to be significantly associated with a more rapid decline in renal function, whereas triglycerides, high-density lipoprotein (HDL) cholesterol, and apolipoprotein A (apoA) were not. Bagdade J D et al[23]Studied lipid profile in 27 patients of CKD, 13 patients not on dialysis, 14 patients on dialysis who had stable chronic uremia. Triglycerides were found to be elevated in both non–dialyzed and dialyzed CKD patients and HDL-C was found to be decreased (<40 mg/dl) in both dialyzed and non-dialyzed groups. Avasthi G et al[24]studied 20 patients of chronic renal failure. During investigation all the patient were placed on conservative treatment for renal failure. They reported high mean triglyceride levels of 181±21.87 and high total cholesterol of 204±50.54 mg/dl respectively.

LDL cholesterol: In our study the LDL cholesterol ranged from 22-263 mg/dl (mean 98.66±45.96 mg/dl). Most of the patients 66 (66%) in the study had normal LDL-cholesterol level (< 100 mg/dl), 18 (18%) patients had near optimal LDL cholesterol level and10 (10%) patients had high LDL level >160 mg/dl.MorenaM et al[25]reported that there was increase in small dense LDL sub-fractions in Hemodialysis patients. Hypertriglyceridemia observed in Hemodialysis patients result from a reduced lipolysis of TG-rich VLDL that leads to the accumulation of partially metabolized remnant lipoproteins (IDL and TG-rich LDL). This lipoprotein catabolism impairment is usually associated with reduced levels of HDL affecting reverse cholesterol transport. Such defect in altherogenic lipoprotein catabolism may predispose to the formation of small dense LDL particles, which appear to be more sensitive to ex vivo oxidation.Hans E N et al[26]observed that lipoprotein abnormalities found in uremia are already present at early stage of renal impairment and excess LDL cholesterol in male is fairly uninfluenced by the degree of renal function and etiology of disease.Jorge J et al[27]demonstrated that elevated LDL level, Heterogeneity in the distribution of LDL and apoprotein specific HDL sub population and abnormalities in the size and composition of both LDL and HDL in both normotriglyceridemic and hypertriglyceridemic population of ESRD patients. These alterations were more marked in hypertrigyceridemic patients.

HDL cholesterol: The HDL-Cholesterol ranged from 16-65 mg/dl (mean 38.83±10.93mg/dl). Most of the patients 55 (55%) had low HDL level (< 40 mg/dl). Among the patients of low HDL,22(22%) patients had diabetic nephropathy,16(16%) patients had obstructive uropathy,12(12%) patients had CGN and 5(5%) patients had Lupus nephritis. Maximum number of patients with diabetic nephropathy had low HDL-cholesterol level. However, this difference was not statistically significant. Attman P O et al[17]found decrease in plasma HDL cholesterol concentration in patients with CRF. It was also reported that decreased HDL was associated with decrease in both the fractional catabolic rate and the total synthetic rate of ApoA$_1$. The slow fractional catabolic rate of ApoA$_1$in patients with chronic renal failure could be a primary event resulting from a decrease in synthesis or secretion of ApoA$_1$.Bagdade J D et al[23]demonstrated that patients of renal failure treated by chronic dialysis have lower HDL levels compared to controls.Jayson R et al[28]observed that HDL cholesterol was significantly reduced in chronic haemodialysis patients whether or not triglyceride level was raised and in patients with type IV hyperlipoproteinemia, protein content of HDL and its sub fraction 1, 2, and 3 were also

reduced in parallel with reduction in cholesterol content in these fraction. Our findings of reduced HDL cholesterol in CKD patients agrees with the findings of others workers.

V.   Conclusion

100 patients of chronic kidney disease who were admitted in the Medicine Department of Regional Institute of Medical Sciences Hospital, Imphal were subjected to detailed clinical examination and different laboratory investigation and lipid profile. The mean age of the patients ranged from 21 to 77 years (mean age 50.38±14.91 yrs). Male female ratio was 1.6:1. Most of the patients 70% had normal BMI. The most common cause of CKD was Diabetic Nephropathy (35%) and Chronic Glomerulonephritis (35%), followed by Obstructive Uropathy. Total Cholesterol ranged from 72-312 mg/dl (mean 162.8±49.4mg/dl).7% patients had high cholesterol (>240mg/dl). Mean Triglyceride level was 118.77±42.96. Hypertriglyceridemia was observed in 23%. Maximum number of patients with diabetic nephropathy (39.1%) had hypertriglyceridemia. Mean LDL cholesterol was 98.66±45.96 mg/dl and10% patients had high LDL level >160 mg/dl. Mean HDL-Cholesterol was 38.83±10.93mg/dl. 55% patients had low HDL level (< 40 mg/dl) and 62.8% patients with diabetic nephropathy had low HDL-cholesterol level.

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