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Original Article

Study of Lipid Profile in Patients with Chronic Kidney Disease on Conservative Management and Haemodialysis

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ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is a silent epidemic of the 21st century. Its occurrence is universal, not confined to the developed countries only. Globally, CKD is the 12th cause of death and the 17th cause of disability, respectively. Dyslipidemia is often observed in patients with CKD, resulting in abnormal concentrations and composition of plasma lipoproteins. The prominent features of uremic dyslipidemia are an increase in plasma triglycerides and cholesterol in nearly all lipoproteins, and a reduction in HDL cholesterol.
Material and methods: This cross sectional observational study was conducted on 90 CKD patients grouped into two based on the treatment as group I included 45 patients undergoing conservative treatment and group II included 45 cases with CKD undergoing hemodialysis. The patients were clinically examined for signs of hyperlipidemia. Laboratory investigations like basic blood profile, blood urea, serum creatinine, serum cholesterol, serum triglyceride, serum LDL, serum HDL and ultrasound abdomen were done.
Results: Mean age of patients was 50.46±13.2 years with male to female ratio 1.5:1. Equal gender distribution was noted between two study groups. In present study Mean values of serum cholesterol, serum triglyceride, serum LDL and serum HDL levels in conservatively managed and hemodialysis group were 185.13±39.5 mg/dl and 158.11±23.7 mg/dl, 138.31±33.6 mg/dl and 97.45±29.7 mg/dl, 114.64±29.6 mg/dl and 98.65±27.6 mg/dl and 39.67±12.1 mg/dl and 35.18±5.5 mg/dl respectively. There was a statistically significant difference observed between the two groups with respect to serum cholesterol (p=0.0001), serum triglyceride (p=0.008), serum LDL (p=0.009) and serum HDL (p=0.025). Lipid profile values were higher in conservatively managed group.
Conclusion: Our study had showed that mean lipid profile is better in patients of CKD on dialysis than those onconservative treatment. When planning therapeutic approaches for CKD patients lipid profileshould always be taken into consideration and identification and treatment of it should be an integral part of CKD patients management protocol.

Keywords*: Chronic Kidney Disease, Lipid Profile, Dyslipidemia.*

INTRODUCTION

Chronic renal failure (CRF) is an irreversible condition that manifests as permanent destruction of kidney tissue or a significant reduction in the rate of glomerular filtration. Dyslipidemia contributes to an elevated danger of atherogenesis in renal failure, which may be undesirable for patients on long-term dialysis. A wide range of biochemical disturbances as well as numerous clinical symptoms and warning signs characterize CRF.(Mathenge et al, 1993) Ureamia, a biochemical alteration, results in hemodynamic abnormalities, cardiac problems, gastrointestinal problems, disorders of the nervous system, osteodystrophy, disorders of the skin, and altered sexual function.(Moronkola et al, 2006) The metabolism of

lipids appears to be altered in the majority of patients with renal insufficiency. A pronounced dyslipidemia develops early in renal failure due to the discrepancy between lipoprotein production and degradation in progressive renal disease.

Chronic kidney disease (CKD) is linked to specific abnormalities in the metabolism of lipids, both in the early stages and in the advanced stages of chronic renal failure. It has been hypothesized that dyslipidemia of renal insufficiency contributes to the progression of glomerulo- and tubulo-vascular lesions and the consequent degradation of renal function.

Diabetes-related kidney disease patients have lower HDL cholesterol and higher TG levels than their non-diabetic counterparts, suggesting that diabetes itself exacerbates lipid abnormalities in patients with renal impairment. The concentration of lipoproteins in renal failure may increase as a result of increased synthesis, decreased catabolism, or a combination of the two. Patients receiving maintenance dialysis also have abnormalities in lipid metabolism, such as hypertriglyceridemia and low HDL, which may contribute to atherosclerosis and coronary disease. Hyperlipidemia is common after renal transplantation with use of immunosuppressive drugs .

Studying and comparing lipoprotein abnormalities in patients with CKD is important since hyperlipemia can be treated therapeutically. Indian studies on lipid abnormalities in CKD have not been consistent. Sharma et al (Sharma et al, 1980) and Kunde et al (Kunde et al, 1977) found no hyperlipidemia, whereas Gupta et al (Gupta, 1991) and Das et al (Das et al, 1984) observed hypertriglyceridemia and reduced high-density lipoprotein (HDL) levels in CKD patients as in western countries. (Chan et al, 1981)

We encounter a large number of patients with CKD with abnormal serum lipid profiles in our institution . A prospective study was taken up, to study the lipid profile in patients of chronic renal failure: a. on conservative management
b. on regular haemodialysis

MATERIALS AND METHODS

This cross-sectionalobservational study was conducted at Department of Medicine,at tertiary care centre in Vidharbha region of Maharashtra. Ninety diagnosed cases of CKD attending the outpatient department or admitted in the hospital were included in the study and divided into two groups based on the treament as conservatively managed and patients on hemodialysis. The patients were clinically examined for signs of hyperlipidemia. Laboratory investigations like basic blood profile, blood urea, serum creatinine, serum cholesterol, serum triglyceride, serum LDL, serum HDL and ultrasound abdomen were done. All the subjects were examined and investigated according to proforma that was predesigned and pretested. Informed consent was obtained from all subjects enrolled in the study.

INCLUSION CRITERIA

- Patients diagnosed as chronic kidney disease and on conservative treatment for six months.
- Patients diagnosed as chronic kidney disease and on hemodialysis for three months.
- Age more than 18 years.
- Male and female patients.

EXCLUSION CRITERIA

- Critically ill patients.
- Patients with acute renal failure and nephrotic syndrome.
- Patients having diabetes, liver disease, Cushing's, or other metabolic disorder.
- Those who are on drugs affecting lipid metabolism such as β-blockers, statins, and oral contraceptive pills.
- Female patients who were pregnant.

All the selected patients were subjected to detailed history and complete physical examination and data collected was noted in a pre-designed proforma. The history of the onset, progression, duration of various symptoms, drug and diet history was noted. Overnight fasting samples were taken and sent to laboratory immediately. Serum was separated within 2 hours after collection to prevent artifactal change in concentration of HDL. After the clot retraction occurred, the serum was transferred out to a centrifuge tube and centrifuged at 2000 rpm for 5 minutes. The supernatant clear serum was then pipetted out using dry piston pipettes with disposable tips and stored in dry thin walled vials at 4^{o}C. The samples were analysed on the same day or within 48 hours. Study of lipid profile by enzymatic method by using autoanalyser Serum triglyceride estimation. This was determined by the fully enzymatic U-V method.

Data was collated on Microsoft Excel spreadsheets and analyzed using SPSS 20.0 software (IBM Corporation, New York, USA). Descriptive statistics were reported as mean (SD) for continuous variables and frequency (percentage) for categorical variables. Pearson's Chi-square test was used to find association between two categorical variables. A p value$<$ 0.05 was considered as statistically sigxnificant.

RESULTS

In our study, equal distribution of cases of conservative management of CKD and hemodialysis were taken (45 cases of either group). In conservative management group, majority of cases were seen in age group 46 to 55 years with mean age 51.46±13.4 years. In hemodialysis group, 13 cases (28.8%) were seen in 46 to 55 years old age group followed by 12 cases (26.7%) in 56 to 65 years old group. Mean age of patients in hemodialysis group was 50.46±13.2 years. No statistical significant was found between age and methodology of treatment (p=0.72). (Table-1)

Table 1: Frequency distribution of age groups of patients

Age (Years)	Conservative management (N)	Percentage (%)	Regular haemodialysis (N)	Percentage (%)
15-25	1	2.2	2	4.4
26-35	4	8.9	3	6.7
36-45	10	22.2	9	20
46-55	12	26.7	13	28.8
56-65	9	20	12	26.7
66-75	6	13.3	3	6.7
>75	3	6.7	3	6.7
Total	**45**	**100**	**45**	**100**
Min-Max	**23-80**		**23-78**	
Mean ±SD	**51.46±13.4**		**50.46±13.2**	**P=0.72^{NS}**
Student's t test was used. P-value<0.05 is considered to be statistically significant. NS-Statistically non-significant.				

The distribution of gender was found to be almost equal in both the groups. In conservatively managed group, 26 males (57.8%) and 19 females (42.2%) were seen. While in hemodialysis group, 27 males (60%) and 18 females (40%) were seen. Overall male preponderence was observed in present study with male to female ratio of 1.5:1. (Figure-1)

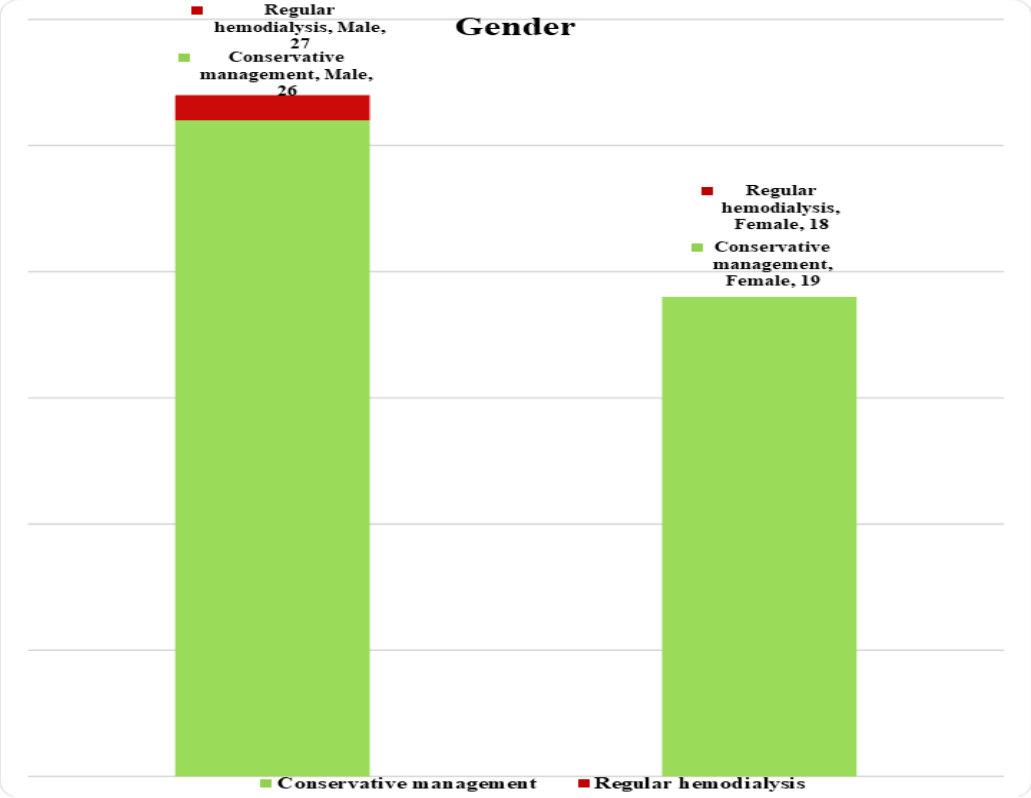

Figure 1: Frequency distribution of gender

In conservatively managed group, 18 cases (40%) had diabetes mellitus and 21 cases (46.7%) had hypertension. In patients receiving regular hemodialysis, 23 patients (51.1%) suffered from diabetes mellitus and 19 patients (42.2%) suffered from hypertension. (Figure-2)

Seven (15.6%) smokers and five each (11.1%) alcoholics and both smokers and alcoholics were managed conservatively. Six (13.3%) smokers, five (11.1%) alcoholics and four (8.9%) cases with both smoking and alcohol addiction were on regular hemodialysis. (Table-2)

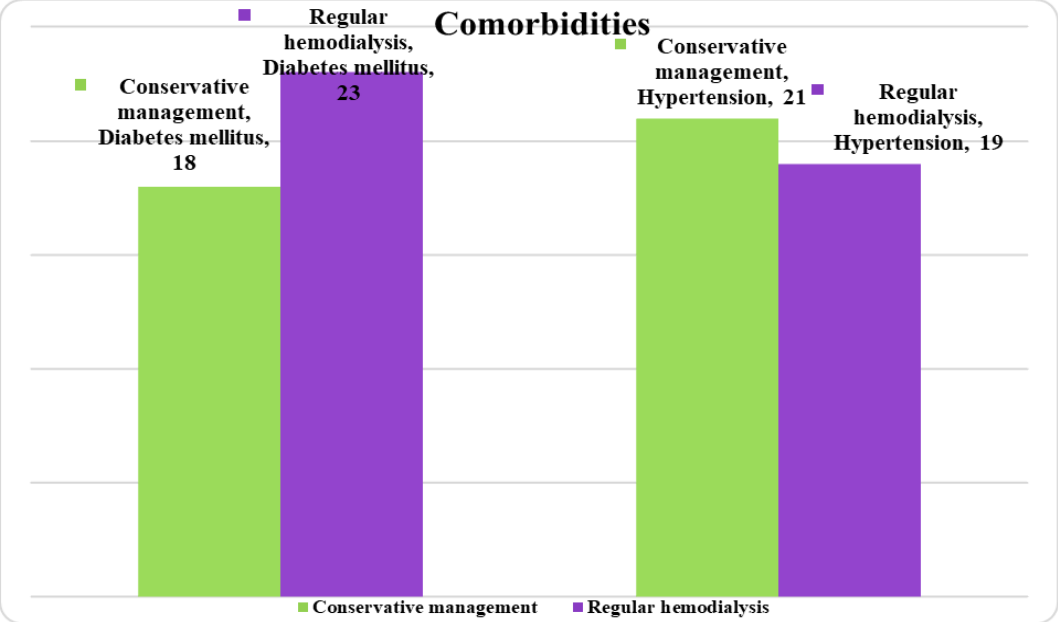

Figure 2: Frequency distribution of comorbidities

Table 2: Frequency distribution of addictions

Type of addiction	Conservative management (N)	Percentage (%)	Regular haemodialysis (N)	Percentage (%)
Smoking	7	15.6	6	13.3
Alcoholism	5	11.1	5	11.1
Smoking + Alcoholism	5	11.1	4	8.9
None	28	62.2	30	66.7
Total	**45**	**100**	**45**	**100**

In conservatively managed group, 4 cases had raised serum cholesterol levels while in hemodialysis group none of the patients had high cholesterol levels. Mean values of serum cholesterol in conservatively managed and hemodialysis group were 185.13±39.5 mg/dl and 158.11±23.7 mg/dl respectively. (Figure-3) A statistically significant difference was observed between the two groups (p=0.0001). Serum cholesterol levels were higher in conservatively managed patients. (Table-3)

Mean values of serum triglyceride in conservatively managed and hemodialysis group were 138.31±33.6 mg/dl and 97.45±29.7 mg/dl respectively. (Figure-3) A statistically significant difference was observed between the two groups (p=0.008). Serum triglyceride levels were higher in conservatively managed patients. (Table-3)

Table 3: Comparison of mean values of various lipid profile parameters

Lipid profile parameters (mg/dl)	Conservative management		Regular hemodialysis		P value
	Mean	SD	Mean	SD	
S. Cholesterol	185.13	39.5	158.11	23.7	0.0001*
S. Triglycerides	138.31	33.6	97.44	29.7	0.008*
S. LDL	114.64	29.6	98.65	27.6	0.009*
S. HDL	39.67	12.1	35.18	5.5	0.025*
Student's t test was used. P-value<0.05 is considered to be statistically significant. NS-Statistically non-significant.					

In majority of patients in conservatively managed patients (25 cases, 55.6%) serum LDL levels were borderline (100 mg/dl to 129 mg/dl). In eight patients (17.7%) serum LDL was above 130 mg/dl. Mean serum LDL levels in conservatively managed patients was 114.64±29.6 mg/dl. Mean serum LDL levels in hemodialysis patients was 98.65±27.6 mg/dl. (Figure-3) An observable and statistically significant difference was seen in mean values of serum LDL of both the groups (p=0.009). Serum LDL levels were higher in conservatively managed patients. (Table-3)

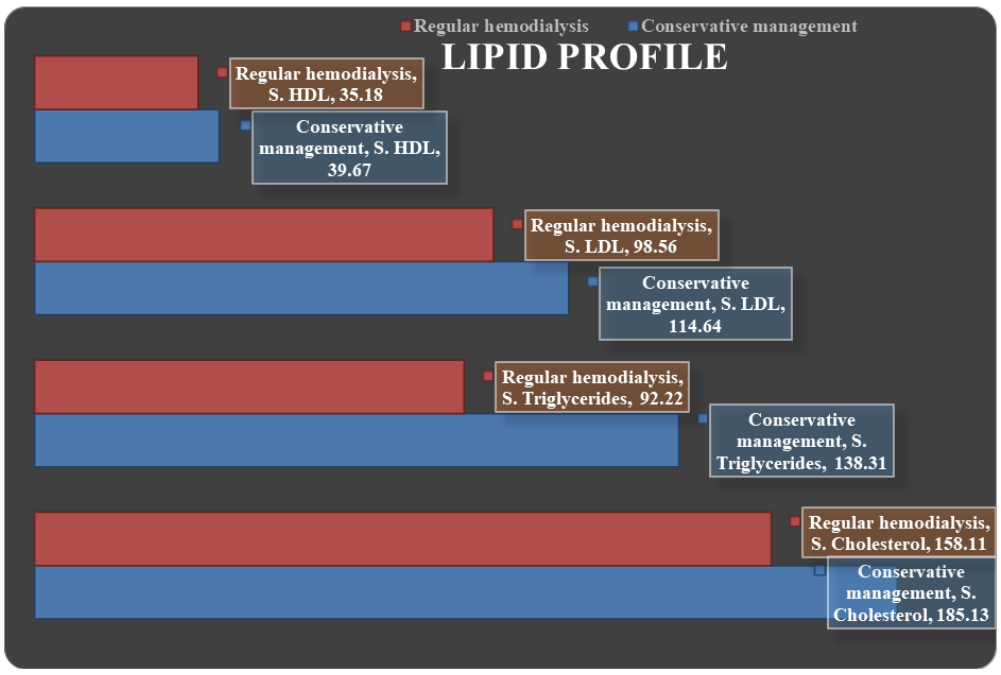

Figure 3: Comparison of mean values of various lipid profile parameters

25 (55.6%), 18 (40%) and two (4.4%) patients managed conservatively had their serum HDL levels below 40 mg/dl, 40-59 mg/dl and above 60 mg/dl respectively. Mean serum HDL level was 39.62±12.1 mg/dl. Similarly, 37 (82.3%) and eight (17.7%) patients receiving hemodialysis had their serum HDL levels below 40 mg/dl and 40-59 mg/dl respectively. Mean serum HDL level was 35.18±5.5 mg/dl. (Figure-3) A statistically significant difference was noted between the two groups (p=0.025). Mean serum HDL value was significantly higher in conservatively managed group than in hemodialysis group. (Table-3)

Mean values of blood urea, serum creatinine, serum sodium and serum potassium in conservatively managed group were 72.42±29.1 mg/dl, 3.56±2.4 mg/dl, 135.28±4.3 mg/dl and 5.93±8.2 mg/dl respectively. While, mean values of blood urea, serum creatinine, serum sodium and serum potassium in hemodialysis group were 73.38±31.1 mg/dl, 3.64±2.5 mg/dl, 134.62±4.7 mg/dl and 5.93±8.1 mg/dl respectively. No difference in the mean values of the two groups was seen in relation to above mentioned parameters. (Figure-4)

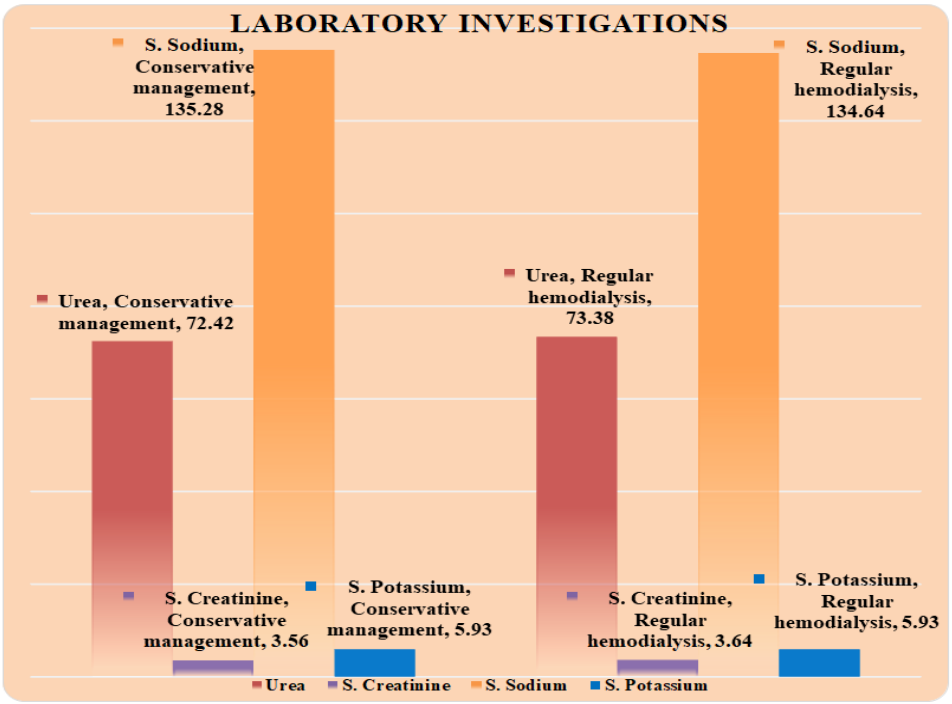

Figure 4: Comparison of mean values of various laboratory investigations

DISCUSSION

Dyslipidemia is often observed in patients with CKD, resulting in abnormal concentrations and composition of plasma lipoproteins. The prominent features of uremic dyslipidemia are an increase in plasma triglycerides and cholesterol in nearly all lipoproteins, and a reduction in HDL cholesterol. The underlying mechanisms behind hypertriglyceridemia may indeed be multifactorial.

In this hospital based study, the lipid profile of patients with CKD were analysed in two groups, on conservative management and on hemodialysis over a period of 18 months. Majority of the participants in both the group were males. Male to female ratio was found to be 1.5:1. The mean age of the CRF patients in the study was 50.96± 13.23 years, which was higher as compared to the study done by Adejumo OA et al (Adejumo et al, 2016) and Kumari RA et al (Kumari & Srinivas, 2018), where mean age was found to be 46.98±16.81 and 45.28 years respectively. Proportion of smoker greater in group A 46.8% than group B 30% and statistically was not significant. In group A and group B 31 (50%) and 37 (56.1%) were diabetic and 31 (50%) and 29(43.9%) were non- 97 diabetic, respectively.

In present study, we found mean blood urea and serum creatinine values in conservatively managed and in hemodialysis group as 72.42±29.1 mg/dl and 73.38±31.1 mg/dl, 3.56±2.4 mg/dl and 3.64±2.5 mg/dl respectively. Also mean serum Na and serum K were 135.28±4.3 mg/dl and 134.62±4.7 mg/dl, 5.93±8.2 mg/dl and 5.93±8.1 mg/dl in conservatively managed and in hemodialysis group respectively.

In present study Mean values of serum cholesterol, serum triglyceride, serum LDL and serum HDL levels in conservatively managed and hemodialysis group were 185.13±39.5 mg/dl and 158.11±23.7 mg/dl, 138.31±33.6 mg/dl and 97.45±29.7 mg/dl, 114.64±29.6 mg/dl and 98.65±27.6 mg/dl and 39.67±12.1 mg/dl and 35.18±5.5 mg/dl respectively. There was a statistically significant difference observed between the two groups with respect to serum cholesterol ($p=0.0001$), serum triglyceride ($p=0.008$), serum LDL ($p=0.009$) and serum HDL ($p=0.025$). Lipid profile values were higher in conservatively managed group.

Study conducted by Baria D et al (Baria et al, 2013) found that there was no significant difference observed between total cholesterol levels in both the groups, HDL cholesterol levels were reduced in CRF patients with hemodialysis and VLDL cholesterol levels found to be higher in CRF patients with hemodialysis.

Adejumo OA et al (Adejumo et al, 2016) had the finding where, dyslipidaemia was commoner in female CKD patients, where asin the study done by Baria D et al (Baria et al, 2013) no significant difference was observed between lipid profile levels among male and female patients.

In study conducted by MD Islam et al (Islam et, 2016) average cholesterol, LDL and triglyceride level were more in group B than group A. But statistically these differences were not significant. On the other hand, HDL level was more in group A than group B and it was also statistically insignificant difference.

Our results were similar to study conducted by Raghu Rama Reddy et al (Reddy et al, 2019) who found in his study that total cholesterol, triglycerides, HDL,LDL, VLDL were significantly lower in the CRF patients on regular hemodialysis. This finding was statistically significant ($p< 0.01$).

Another Indian study on dyslipidemia in patients with CRF and renal transplantation by Shah et al (Shah et al, 1994) demonstrated that triglycerides level was elevated significantly in CRF patients on conservative management.These results show that hypertriglyceridemia is an important lipid abnormality in patients with CRF.

Sumathi ME et al (Sumathi et al, 2010) studied serum lipid profile in 30 conservatively treated and 30 haemodialyzed Chronic Renal Failure (CRF) patients.They found higher total cholesterol, TGL, HDLc, and VLDLc andLDLc in conservatively treated CRF patients as compared withthe haemodialyzed patients and the difference was statistically significant except LDLc which was not significant.

CONCLUSION

Dyslipidemia is a very common complication of CKD. Disturbance in lipoprotein metabolism usually follow a downhill course that parallels the deterioration in renal function.The lipoprotein abnormalities caused by renal insufficiency also may further influence the progression of renal failure. Since dyslipidemia and its complications are more prevalent in chronic kidney disease patients, early diagnosis of dyslipidemia is indicated and potential therapeutic approaches (therapeutic life style changes and pharmacotherapy should be initiated to limit the long term consequences of cardiovascular disease in this population of patients, whose longevity is anticipated to increase with dialysis and transplantation.

Our study had showed that mean lipid profile is better in patients of CKD on dialysis than those onconservative treatment. When planning therapeutic approaches for CKD patients lipid profileshould always be taken into consideration and identification and treatment of it should be an integral part of CKD patients management protocol.

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