

## A Study of Lipid Profile in Chronic Renal Failure Patients Undergoing Hemodialysis

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**Abstract:** Chronic Kidney Disease (CKD) exhibits dyslipidemia which is well known traditional risk factors for vascular complications. So, this present study was planned to evaluate whether hemodialysis has an effect on the lipid profile of the CRF patients. Present study were divided into three groups, Group-I: healthy controls (35), Group-II: CRF patients who never undergone hemodialysis (30) and Group-III: CRF patients on hemodialysis (25). Serum samples from patients and healthy subjects were obtained and analyzed for lipid profile. Serum triglyceride and VLDL levels were significantly higher in group-II and III when compared to controls. HDL levels were significantly lower in group-II and III as compared to control. There was no significant change noted in total cholesterol and LDL levels between all groups. Our analysis suggest that CRF patients with and without hemodialysis exhibited dyslipidemia pattern irrespective of hemodialysis process.

**Keywords:** Chronic renal failure, Hemodialysis, Lipid profile.

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### I. Introduction

Dyslipidemias is a very common complication of Chronic Renal Failure (CRF). Disturbances in lipoprotein metabolism are evident even at the early stages of CRF and usually follow a downhill course that parallels the deterioration in renal function. Recently published studies indicate that dyslipidemias in these patients may actively participate in the pathogenesis of Cardiovascular disease (CVD) as well as in the deterioration of renal function.<sup>1</sup> The characteristic lipid abnormalities seen in CRF patients are elevated triglycerides, normal/reduced total cholesterol (TC), decreased High Density Lipoprotein (HDL), normal Low Density Lipoprotein (LDL)<sup>2</sup> Progressive CRF not only leads to End stage renal disease (ESRD), but it is associated with high cardiovascular morbidity & mortality. In fact, patients with CRF are much more likely to die because of dyslipidemias than to progress to ESRD.<sup>3</sup> With the implication of plasma lipids in the pathogenesis of atherosclerosis and ischemic heart disease, it becomes worthwhile to study the behavior of various lipid fractions in CRF patients.<sup>4</sup> CVD constitutes the major cause of death in patients with ESRD and it is still higher in hemodialysis patients than in post transplantation patients.<sup>5</sup> ESRD Patients on hemodialysis have abnormalities in lipoprotein structure and metabolism and have a high incidence of cardiovascular diseases.<sup>6</sup> Keeping in view the different outcomes of the researchers regarding hemodialysis modality in CRF patients, the present study was designed to see any impact of hemodialysis on lipid profile in CRF patients with and without hemodialysis.

### II. Materials And Methods

This prospective, observational study was carried out at Kakatiya Medical College, Rangampet, and Warangal between 2012 - 2015. Informed consent from patients and institutional ethical approval was obtained. 55 patients of CRF and 35 healthy controls were recruited for this study. In order to understand the influence of dialysis on lipid profile, the patients were divided into 2 groups: those who have CRF but undialysed and those who are on maintenance hemodialysis for more than 6 months. Thus, study was divided into Group-I (healthy controls), Group-II (CRF patients who have never undergone hemodialysis) and Group-III (CRF patients on hemodialysis). Exclusion criteria include Body mass index (BMI) more than 24.9 kg/m<sup>2</sup>, known case of acute renal failure/diabetes mellitus/hypertension/ischemic heart disease, taking drugs that affect lipids and lipoproteins level. 5 ml of venous blood samples were collected in plain tubes after an overnight fast. After collection, the samples were allowed to clot for half an hour following which the samples were centrifuged and serum was analysed. Serum total cholesterol (TC), triglycerides (TGs), HDL cholesterol (HDL-C), LDL cholesterol (LDL-C), Lp(a), urea and creatinine, were measured colorimetrically using commercially available kits on fully auto analyzer of Clinical Biochemistry Laboratory. VLDL cholesterol concentration was calculated using Friedewald's Formula. In data analysis, comparison of parameters was done by using unpaired t-test.

### III. Results

The baseline characteristics of study population are shown in table I. Table II revealed the biochemical parameters among control and CRF patients with and without hemodialysis. Among 3 groups, 90% patients of CRF with hemodialysis have elevated triglyceride level and 80% patients without hemodialysis have elevated triglyceride level as compared to controls ( $p < 0.01$ ). There is no significant difference observed between total cholesterol levels in all the three groups. HDL cholesterol levels reduced in CRF patients with and without hemodialysis as compared to controls ( $p < 0.05$ ). Reduction in HDL cholesterol is observed in 60% of the CRF patients with hemodialysis as compared to 10% in CRF patients without hemodialysis ( $p < 0.01$ ). There is no significant difference observed between LDL cholesterol levels in all the three groups. VLDL cholesterol levels found to be higher in CRF patients with and without hemodialysis as compared to the controls ( $p < 0.01$ ). There was no significant difference observed between lipid profile levels in male and female patients in CRF patients with and without hemodialysis and in control group.

**Table1.** Baseline Characteristics of Study Population

	Group1 (n=35)	Group 2 (n=30)	Group 3 (n=25)
Age (years )Mean $\pm$ SD	44.56 $\pm$ 11.2	43.45 $\pm$ 10.33	46.67 $\pm$ 11.34
Sex (M/F)	15/10	14/11	11/9
BMI(kg/m <sup>2</sup> )	23.3 $\pm$ 1.34	22.12 $\pm$ 0.45	21.37 $\pm$ 1.34
Urea(mg/dl)	24.3 $\pm$ 5.66	138.2 $\pm$ 45.6	102 $\pm$ 36.2
Creatinine (mg/dl)	0.76 $\pm$ 0.34	11.67 $\pm$ 2.45	5.66 $\pm$ 1.98

**Table2.** Lipid Profile among Control and CRF Patients

Parameters (mg/dl)	Group1 (n=35)	Group 2 (n=30)	Group 3 (n=25)
TC	172.3 $\pm$ 14.2	43.45 $\pm$ 10.3	46.67 $\pm$ 11.3
TGs	136.78 $\pm$ 18.3	206.7 $\pm$ 15.3*	236.3 $\pm$ 13.4*
HDL	43.3 $\pm$ 11.34	41.12 $\pm$ 9.45*	26.37 $\pm$ 8.34*
LDL	104.3 $\pm$ 5.6	101.2 $\pm$ 4.6	102.3 $\pm$ 3.2
VLDL	24.76 $\pm$ 0.34	43.67 $\pm$ 4.2*	45.66 $\pm$ 1.08*

\* $p > 0.05$

**Table 3:** Lipid Profile between CRF Patients with or Without Hemodialysis

	TGs	TC	HDL	LDL	VLDL
CRF patients without dialysis	Increased	No change	Decreased	No change	Increased
CRF patients with dialysis	Increased	No change	Decreased	No change	Increased

### IV. Discussion

CRF is a worldwide health problem and is the leading cause of morbidity and mortality in the developed world. Patients with CRF are at high risk for CVD and cerebrovascular disease (CBVD), and they are more likely to die of CVD than to develop ESRD. CRF is associated with premature atherosclerosis and increased incidence of cardiovascular morbidity and mortality<sup>7</sup>. Several factors contribute to atherogenesis and cardiovascular disease in patients with CRF, the notably among all is dyslipidemias.<sup>8</sup>Chronic renal failure, per se, primarily affects the metabolism of high-density lipoprotein (HDL) and triglyceride (TG)-rich lipoproteins.<sup>9</sup>The characteristic dyslipidemias observed in CRF patients without hemodialysis in this study are shown in table III which were also reported by Amin et al (2006)<sup>2</sup>, Vaziri et al (2006)<sup>10</sup> and Saland et al (2007)<sup>11</sup>. Cardiovascular disorders are one of the most serious problems in chronic hemodialysis patients. The mortality due to cardiovascular disease in hemodialysis patients is estimated to be 9% annually and is 30 times higher than that observed in the general population<sup>12</sup>. Dyslipidemias observed in CRF patients with hemodialysis in this study are shown in table III which were also supported by Janicki et al (2007)<sup>13</sup>, Mekki et al (2009)<sup>14</sup> and Reddy et al (2009)<sup>15</sup>. In hemodialysis patients, post heparin plasma lipoprotein lipase activity and hepatic lipase activity have been reported to be reduced, while the apo CII/apo CIII ratio is decreased. A possible disturbance in both enzymes, accompanied by an increase in apo CIII in VLDL, results in a prolonged half-life of the VLDL particles, which may explain the observed hypertriglyceridemia in these patients<sup>16-18</sup>. However, the effects of long term hemodialysis on lipolytic activities are not be clarified. Literature data about the effect of hemodialysis duration on dyslipidemias generated by CRF are few and controversy. The present study demonstrates that in CRF patients treated by intermittent dialysis, long-term hemodialysis fails to treat dyslipidemias generated by CRF.

### V. Conclusion

CRF patients with and without hemodialysis are at high risk of development of dyslipidemias. Hemodialysis can effectively reduce the accumulation of nitrogenous waste products but fails to clear dyslipidemias generated during the course of CRF. But still the patients on hemodialysis are still exposed to

several of the metabolic consequences of renal failure. A strict monitoring of lipid profile and lipoproteins can reduce the morbidity and mortality rate and will also improve the quality of life of CRF patients.

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