Original Article

ISSN (O): XXXX-XXXX; ISSN (P): XXXX-XXXX

A Comparative Study of Lipid Profile in Chronic Renal Failure Patients on Dialysis

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Abstract

Background: Chronic renal failure (CRF) is characterized by loss of kidney function due to lasting damage to nephrons resulting in decreased estimated glomerular filtration (eGFR) and suppressed urine formation. Disturbance of lipid profile in CRF has been found associated with increased triglycerides (TG) and low high-density lipids while the normal level of total cholesterol (TC) and low-density lipids (LDL). Dislipidemia in CRF patients induces cardiovascular diseases (CVD); in addition, CVD in turn leads to the more rapid destruction of the kidney. Therefore the present study was designed to evaluate the lipid profile in CRF patients with and without dialysis. **Subjects and Methods:** This was a prospective type of study conducted in the Department of Medicine of a tertiary care centre from July 2019 to December 2019. A total of 100 patients of CRF patients and 40 normal control subjects were recruited for the study. CRF patients were divided into two groups. Group, I consisted of CRF patients with dialysis and group II included CRF patients without dialysis. Normal subjects were kept under a group III control group. **Results:** The study revealed that there was a significant difference between TG, HDL and VLDL of group I ($p>0.01$) and group II ($p>0.01$) in comparison to group III. On the other hand, no significant variation was seen in the TC and LDL levels of the groups mentioned. **Conclusion:** CRF patients either with dialysis or without dialysis have a great possibility of developing dyslipidemia as well as CVD. Dialysis has been found effective in reducing nitrogenous waste products in the blood; however, it is not able to decrease the lipid profile in CRF patients.

Keywords: Chronic renal failure, triglycerides, CVD, dialysis.

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Received: 30 October 2020 **Revised: 1 December 2020** **Accepted: 14 December 2020** **Published: 30 December 2020**

Introduction

Chronic renal failure (CRF) is a type of kidney disease in which irreversible damage to nephrons leads to decreased estimated glomerular filtration and suppressed urine formation.[1] Broad-spectrum signs and symptoms along with the alteration of biochemical parameters are found in the case of CRF.[2] CRF leads to disorders of the cardiovascular system, gastrointestinal system, central nervous system and skin.[3] Dyslipidemia is a disorder that develops at the early onset of CRF. Most of the CRF patients suffer from dyslipidemia due to alteration in lipid metabolism as a result of the imbalance between synthesis and degradation of lipids.[4,5]

Disturbance of lipid profile in CRF has been found associated with increased triglycerides (TG) and low high-density lipids while the normal level of low-density lipids (LDL) and total cholesterol (TC). Dislipidemia in CRF patients induces cardiovascular diseases (CVD); in addition, CVD in turn leads to the more rapid destruction of the kidney.[6] Various CVD including atherosclerosis, hypertension and ischemic heart disease have been caused due to altered levels of lipid profile in CRF patients. The result of progressive CRF is end-stage renal diseases (ESRD), increased pathology of CVD; higher rates of morbidity and mortality among patients. But studies suggest that patients suffering from CRF are more likely to die of CVD instead of ESRF.[7,8]

Therefore, this study was designed to evaluate the lipid profile in CRF patients with and without dialysis.

Subjects and Methods

A prospective study was conducted in the Department of Medicine of a tertiary care centre from July 2019 to December 2019. A total of 100 patients of CRF and 40 normal control subjects were recruited for the study. CRF patients were divided into two groups. CRF patients with dialysis were placed in group I and group II comprised of CRF patients without dialysis. Group III was the control group with normal subjects. Informed written consent was taken from each participant for the study. The study got approval from

the ethical committee of the Institute. Exclusion criteria for the study included obesity, hypertension, diabetes mellitus, ischemic heart disease, tuberculosis and patients on lipid-lowering medicines.

Collection of the sample- Fasting blood samples (5ml) were collected in tubes. After that samples were allowed to clot they were centrifuged to separate the serum.

Biochemical estimation

The serum concentration of total cholesterol was estimated by the enzymatic CHOD-POD method.9 The serum concentration of triglycerides was measured by the GPO-PAP method. HDL by CHOD-POD/ Phosphotungstate method.[9] The serum concentration of LDL and VLDL were measured using Friedewald's formula.[9]

The Statistical Analysis – All the results were presented as mean ± SD. p-value <0.05 was considered significant. Results were evaluated using the unpaired t-test

Results

In [Table 1] the baseline characteristics of the study participants are listed. It is evident that there are no significant differences between the age and BMI of the subjects in all three groups. However, a notable difference between the urea and creatinine of group I (p>0.01), and group II (p>0.01) in comparison to group III. [Table 2] reveals the difference between TG, HDL and VLDL of group I (p>0.01) and group II (p>0.01) in comparison to group III. However, TC and LDL variations were not evident in all groups.

Discussion

CRF is a common kidney dysfunction disease that has resulted in morbidity and mortality throughout the world especially in developing countries like India. Patients suffering from CRF have a high risk of CVD. Atherosclerosis and other CVD have been found associated with CRF. Moreover, most of the patients with CRF die due to CVD instead of ESRD.[10] Dyslipidemia is one of the most important factors which contribute to atherosclerosis and the severity of CVD in CRF patients.[11] CRF impaired lipid metabolism and induces an imbalance between production and destruction of lipoproteins especially HDL and TG.[12] The present study showed there was an increase of TG in patients of CRF with dialysis in comparison to CRF patients without dialysis and control subjects. Study findings are consistent with the findings of the prior studies of Amin et al,[6] Vaziri et al.[13] and Saland et al.[14] as they observed similar changes in the lipid profile of CRF patients on hemodialysis. It has been suggested in the literature that alteration of lipid metabolism starts with the starting of CRE and manifested itself by increasing TG.[15] Results of the present study have shown that there was a significant difference between the lipid profile (p>0.01) of CRF patients with hemodialysis and control subjects. These findings are similar to the findings of Gupta DK,[16] Das BS et al,[17] Zoccali C and Chan et al Further,[18,19] Janicki et al and Reddy et al also observed a similar disturbance of lipid profile in CRF patients.[20,21] Activities of hepatic lipase and post heparin plasma lipoprotein have been found decreased in CRF patients. Moreover, the ratio of CII vs apo CIII has been found reduced. This increased level of TG may be due to the increase of apo CIII as it increases the half-life of VLDL.[22–24]

There is not much clarity about the cause of lipolytic activity in CRF patients on hemodialysis.

Findings of the present study suggest that hemodialysis was insufficient to treat dyslipidemia in CRF patients.

Conclusion

CRF patients on dialysis or without it, have a great possibility of developing dyslipidemia as well as CVD. Dialysis has been found effective in only reducing nitrogenous waste products in blood and not responsible for causing variations in lipid profile in CRF patients. This study suggests that lipid profiles should be carefully monitored and treated to decrease the occurrence of CVD in patients suffering from CRF with or without dialysis.

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Table 1: Baseline Characteristics of the Study Population

	Group I (n=50)	Group II (n=50)	Group III (n=40)
Age (years) Mean ±SD	43.77±10.74	44.55±11.56	43.66±10.4
Sex (M/F)	27/23	29/21	23/17
BMI (kg/m2)	22.17±1.84	22.32±1.25	22.73±1.64
Urea (mg/dl)	109±26.4*	146.8± 41.8*	26.3±6.76
Creatinine (mg/dl)	6.16± 1.75*	12.87±3.65*	0.81±0.27

*= significant (p>0.01)

Table 2: Lipid Profile among Control and CRF Patients.

Parameters (mg/dl)	Group I (n=50)	Group II (n=50)	Group III (n=40)
TC	44.37±12.3	42.16±12.6	182.8±16.2
TG	244.3±22.4*	210.7±21.7*	146.56±17.3
HDL	28.27±7.54*	34.22±8.45*	44.7±11.34
LDL	112.3±7.2	102.3±5.6	107.5±4.6
VLDL	43.16±2.08*	41.27±3.6*	27.19±1.14

*= significant (p>0.01)

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

	TG	TC	HDL	LDL	VLDL
CRF patients with dialysis	Increased	No change	decreased	No change	Increased
CRF patients without dialysis	Increased	No change	decreased	No change	Increased

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How to cite this article: Haryaktar N, Balik AA. A Comparative Study of Lipid Profile in Chronic Renal Failure Patients on Dialysis. Adv Clin Med Res. 2020;1(1):8-11.

Source of Support: Nil, **Conflict of Interest:** None declared.