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Original Research Article

A STUDY OF LIPID PROFILE IN CHRONIC KIDNEY DISEASE IN PRE-DIALYSIS AND POSTDIALYSIS PATIENTS AT RAMA MEDICAL COLLEGE

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Abstract

Background: Chronic kidney disease (CKD) is one of the world's public health challenges, with a bigger burden and a very high cost of care in countries that are developing like India. **Materials and Methods:** A total of 50 patients were investigated. These individuals were chosen at random, and their serum urea, creatinine, sodium, potassium, and lipid profiles were measured before and after dialysis. **Result:** Urea, creatinine, sodium, and potassium levels in renal disease patients before and after dialysis. Urea, creatinine, and potassium levels fell after dialysis, whereas salt levels increased. A p-value was determined to compare the pattern of lipid profile between the two groups. The p-value of 0.05 was deemed significant. TC, TG, HDL, LDL, and VLDL levels in renal disease patients before and after dialysis. Following dialysis, TC, TG, LDL, and VLDL levels fell while HDL levels increased. A p-value was determined to compare the pattern of lipid profile between the two groups. **Conclusion:** Serum urea and creatinine levels were found to be considerably lower in individuals after hemodialysis, whereas electrolytes returned to normal. This study confirms the importance of dialysis in the prognosis of chronic renal failing patients. Dyslipidemia is frequent in CKD patients. Maintenance hemodialysis worsens dyslipidemia by increasing serum triglycerides while decreasing HDL. This raises the risk of cardiovascular disease and future CKD progression.

INTRODUCTION

Chronic kidney disease (CKD) is characterised by a persistent decline in glomerular filtration rate (GFR) and changes in kidney structure or function, both of which can be harmful to health.[1] The frequency and incidence of CKD are increasing year after year, making it a global health concern. In India, the estimated prevalence of CKD is 785 individuals per million population.[2]Chronic kidney disease encompasses a number of pathophysiological mechanisms linked to reduced kidney function and a progressive illness. The rate of glomerular filtration is decreasing. Patients with chronic renal disease are more prone to atherosclerosis risk factors such as oxidative stress, endothelial dysfunction, and dyslipidemia.[1,2] The two predominant lipid abnormalities are triglyceride and triglyceride-rich lipoprotein increase and low HDL-C values.[5-7] Chronic kidney disease raises cardiovascular risk, which grows with declining kidney function and is highest in people receiving continuous dialysis for end-stage renal disease.[8,9] As a result, it was critical to explore how dialysis influenced the lipid profiles of CKD patients. The analytical portion of this investigation includes urea, creatinine, electrolytes, and lipid profile samples from 50 patients with chronic renal failure before and after dialysis.

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MATERIALS AND METHODS

The current study was conducted on dialysis patients with renal failure aged 20 to 79 years old, including males and females. Blood was obtained from the dialysis centre of R.M.C. & H.R.C. Mandhana, Kanpur, for pre and after CKD study. Before and after dialysis, blood was drawn from each patient. A total of 50 patients were investigated. These individuals were chosen at random, and their serum urea, creatinine, sodium, potassium, and lipid profiles were measured before and after dialysis. Renal failure is characterised by the gradual, progressive, and irreversible loss of normal kidney function. This study includes 50 patients who were diagnosed with renal failure at R.M.C. & H.R.C. Mandhana Kanpur. Creatinine is a byproduct of muscle metabolism, and high levels indicate renal dysfunction. Dialysis had a significant influence on serum creatinine levels, which were decreased to near normal levels.

Following the creation of a suitable template, data were entered into Microsoft Excel. The data entered was then imported into IBM Corp.'s Statistical Package for Social Science (SPSS) software version 20 (Armonk, NY, USA) and analysed. The blood urea level, serum creatinine level, serum sodium, potassium, and lipid profile were all expressed in terms of mean SD, and the paired ttest was used to compare the mean values of lipid analytes before and after dialysis. A p-value of 0.05 was deemed statistically significant.

RESULTS

The study comprised 50 dialysis-dependent CKD patients. Their ages ranged from 27 to 79 years, with a mean of 48.26±10.49 years. There were 30 males and 20 females among the 50 study participants. Dialysis patients with CKD were more common in the 50-60 year age group. The relationship between age and gender and ESRD was not determined to be statistically significant.

[Table 1] shows the urea, creatinine, sodium, and potassium levels in renal disease patients before and after dialysis. Urea, creatinine, and potassium levels fell after dialysis, whereas salt levels increased. A p-value was determined to compare the pattern of lipid profile between the two groups. The p-value of 0.05 was deemed significant. As can be seen, the mean concentrations of urea, creatinine, sodium, and potassium before dialysis were 122.92±25.04 mg/dl, 7.91±2.20 mg/dl, and 4.28±1.41 mEq/L, respectively, and dropped to 23.9±3.79 mg/dl, 1.02±0.19 mg/dl, and 3.70±1.32 mEq/L, respectively. This reduction was statistically significant (P = 0.05). Sodium was the only electrolyte that rose after dialysis. The mean sodium level was 137.41±2.44 mEq/L before dialysis and 3.70±1.32 mEq/L after dialysis, a nonsignificant rise.

Table 1: Shows the comparison of pre and post dialysis biochemical parameters.

Biochemical Parameters	Pre- dialysis (Mean±S.D.)	Post- dialysis (Mean±S.D.)	P value
Urea (mg/dl)	122.92±25.04	23.9±3.79	<0.01
Creatinine (mg/dl)	7.91±2.20	1.02±0.29	<0.01
Sodium mEq/L	137.4±12.44	140.02±13.15	<0.01
Potassium mEq/L	4.28±1.41	3.70±1.32	<0.03

Table 2: Shows the comparison of pre-dialysis lipid profile level with post-dialysis.

Biochemical Parameters	Pre- dialysis (Mean±S.D.)	Post- dialysis(Mean±S.D.)	P value
Total Cholesterol(mg/dl)	180.98 ± 27.36	168.18 ± 21.13	<0.001
Triglycerides (mg/dl)	113.56 ± 13.62	108.36 ± 11.67	<0.001
HDL-c(mg/dl)	41.66±5.76	44.96±14.62	0.04
LDL-c(mg/dl)	128.23 ± 16.43	120.24 ± 17.48	<0.001
VLDL-c(mg/dl)	36.23 ± 3.76	33.94 ± 2.64	0.01

[Table 2] shows the TC, TG, HDL, LDL, and VLDL levels in renal disease patients before and after dialysis. Following dialysis, TC, TG, LDL, and VLDL levels fell while HDL levels increased. A p-value was determined to compare the pattern of lipid profile between the two groups. The p-value of 0.05 was deemed significant. As can be seen, the mean concentration of TC, TG, and LDL before dialysis was 180.98 ±27.36 mg/dl, 113.56± 13.62 mg/dl, and 128.23 ±16.43 mg/dl, respectively, while after dialysis it was 168.18± 21.13 mg/dl, 108.36 ±11.67 mg/dl, and 120.24 ±17.48 mg/dl, respectively. This reduction was statistically significant (P = 0.05). VLDL levels reduced significantly (P = 0.01) after dialysis in this research. The mean VLDL concentration before dialysis was 36.23±3.76 mg/dl, while after dialysis it was 33.94±2.64 mg/dl. HDL was the only lipoprotein that increased after dialysis. The mean HDL level was 41.66±5.76 mg/dl before dialysis and 44.96±14.62 mg/dl after dialysis, albeit the difference was not statistically significant.

DISCUSSION

Chronic renal failure is one of the progressive disorders that causes an irreversible decrease in the glomerular filtration rate, resulting in an increase in serum creatinine and blood urea nitrogen levels.[10] The most prevalent causes of chronic renal failure are hypertension, diabetes, autoimmune diseases, and so on. Because it is permanent and advances to a more severe form over time, with a drop in

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glomerular filtration rate of 5 to 10% with high levels of uremia.[11] These biochemical changes in the blood mirror the disease's signs and symptoms. Chronic dialysis lowers the frequency and severity of these abnormalities, resulting in the disappearance of overt signs of uremia. We wanted to see if serum electrolytes (sodium and potassium) differed before and after dialysis. Serum potassium levels were greater in the predialysis group than in the postdialysis group (P-value 0.03 extremely significant). Serum salt levels were lower in pre-hemodialysis patients than in post-hemodialysis patients. CRF is a global health issue and the main cause of morbidity and mortality in the developed world. Patients with CRF are predisposed to CVD and cerebrovascular disease (CBVD), and they are more likely to die from CVD than from ESRD. CRF is linked to early atherosclerosis and an elevated risk of cardiovascular morbidity and mortality. Several variables, most notably dyslipidemias, lead to atherogenesis and cardiovascular disease in CRF patients.[12] Chronic renal failure affects the metabolism of high-density lipoprotein (HDL) and triglyceride-rich lipoproteins (TG).[13] We discovered hypertriglyceridemia in CRF patients with and without hemodialysis in our study. Triglyceride levels are higher due to decreased activity of lipoprotein lipase (LPL), which hydrolyzes triglycerides, as well as increased triglyceride synthesis in the liver from free fatty acids released from adipose tissue and muscles.[14] Continuous hemodialysis patients have an atherogenic serum lipid profile after hemodialysis begins. Triglycerides, VLDL-C, and HDL levels were observed to be higher during maintenance hemodialysis. Deighan CJ, Caslake MJ, and McConnel discovered the same lipid alterations in dialysis patients in a research. Shoji T and Huttunnen JK discovered the same changes when they investigated the role of heparin in the pathophysiology of hemodialysis-induced dyslipidemia.[15,16]

CONCLUSION

Serum creatinine and serum urea levels have a strong association in renal failure patients. Hemodialysis is an efficient and necessary method for the filtration of unwanted metabolites such as creatinine, urea, electrolytes, and lipid profile over a wide range, thereby reducing the strain on the kidneys.

CRF patients on continuous hemodialysis are more likely to develop dyslipidemia, which is characterised by hypertriglyceridemia, high VLDL, and decreased HDL values without regard to gender. Hemodialysis can successfully minimise the accumulation of nitrogenous waste products, however it cannot remove dyslipidemia caused by CRF. Based on the current study's findings, it is indicated that prescription cholesterol lowering medication in CRF patients with dyslipidemias to prevent future episodes of cardiovascular events could benefit and will also protect renal function. A careful monitoring of the lipid profile and lipoproteins can help to minimise morbidity and mortality.

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