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Lipid Profile in Chronic Renal Failure Patients on Haemodialysis

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ABSTRACT

Objective: *This study aims to evaluate the levels of lipid profile parameters in Chronic Renal Failure patients on Maintenance hemodialysis and to compare its level with age matched healthy control population.*

Method: *Cross sectional study involving 262 Individuals between the age 46 -75 years in the population of Bengaluru, India between February 2022 to May 2023. Venous blood was collected from 131 CRF patients on MHD and from 131 healthy individuals and analyzed for lipid profile parameters TC, TG, VLDL,LDL,HDL. and urea,creatinine.*

Results: *In MHD patients, serum TG and VLDL levels were found to be significantly elevated compared to healthy control population. HDL was significantly reduced compared to control healthy population. There was no significant change in the levels of TC and LDL.*

Conclusion: *Frequent monitoring of these lipid profile parameters may help in better treatment, hence itmay reduce the morbidity and mortality of Patients on MHD.*

Keywords

Lipid Profile, Maintenance hemodialysis, Chronic Renal Failure, End Stage Renal Disease.

Introduction

In Chronic Renal Failure (CRF) there is loss of both glomerular and tubular function of the nephron [1]. Progressive CRF leads to End Stage Renal Disease (ESRD) which is defined as irreversible decline in kidney function which can be fatal in the absence of dialysis or transplantation. ESRD is classified as stage 5 chronic kidney disease which is defined as GFR less than 15ml/min per 1.73m^2 body surface area or those requiring dialysis [2-4]. ESRD patients who are on prolonged dialysis treatment are at the risk of atherosclerosis and hence cardiovascular disease [5]. Acute Myocardial infarction and cerebrovascular disease are the major cause behind the increased morbidity and mortality of these patients [6]. Hyperlipidemia is one of the risk factors of Atherosclerosis. Hyperlipidemia is noted by some investigators in CRF patients who are on MHD [7,8]. Studies on lipid profile in CRF patients on MHD were conducted by several researchers and noted contradictory results. Some researchers have noted alteration in the levels of all the lipid profile parameters [7-13]. While other investigators have noted no alteration in any of the lipid profile parameters [14,15]. Some researchers have reported alteration only in some of the parameters in lipid profile and their findings were contradictory to each other regarding the type of lipid parameter showing the altered level [16-23]. Hence the present study was undertaken to study the pattern of lipid profile parameters in CRF patients undergoing MHD. Results of this study may be useful in the treatment of CRF patients on MHD reducing their morbidity and mortality rate hence improving their quality of life.

Study Design

This is a cross sectional study conducted at the Shree Krishna Sevashrama Hospital, Bengaluru, Karnataka, India January 2022 to May 2023. A total of 262 individuals matched for age and gender. were included in this study. After obtaining the Institutional ethical committee approval, informed consent was taken from all the

individuals participated in this study. The subjects were divided into 2 groups. The group 1 comprised of 130 healthy Individuals who had availed Master Health checkup plan for men and wellness plan for women offered by the institution and were in the age group 46-75 years of either gender. The group 2 comprised of 132 CRF patients on MHD. Mean Duration of the dialysis was 3.40 ± 2.46 years with frequency of 2 sessions per week. Age and gender of these patients were obtained from hospital records. The health examination provided the anthropometric measurements, including weight and height. . Weight was measured using an electronic digital scale, and height was measured using a wall-mounted stadiometer.

Sample collection and Biochemical Analysis

Blood samples were obtained for biochemical tests. After an overnight fast of 12hours, 5ml of whole blood sample was collected from anticubetal vein by taking aseptic precautions. The sample was allowed to clot. Serum was separated and used for the analysis of lipid profile Total Cholesterol (TC), Triglycerides (TG), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Very Low-Density Lipoprotein (VLDL). All these were analyzed using an Olympus AV Autoanalyser (using Diasys reagents) manufactured by Diasys Diagnostic system GmbH, Holzheim, Germany. Lipid profile parameters such as TC was measured using the cholesterol oxidase-peroxidase (CHOD-POD) enzymatic photometric method, while HDL was determined using antihuman β lipoprotein antibodies that liberated only HDL-cholesterol that in turn were analyzed by the enzymatic (CHE, CHO, POD) method. LDL was determined using homogeneous direct measurement using the color-producing enzymatic reaction as only LDL is selectively protected and then released. TG was measured using the glycerol 3-phosphate oxidase (GPO) enzymatic method, whereas VLDL was calculated by performing an indirect calculation from TG result using the Friedwald formula.

Statistical analysis

The data were expressed as mean ± S.D. All the statistical analysis was performed using the SPSS statistical tool.Student t test was performed to find the difference in the levels of lipid profile parameters between the two groups. The results of all the tests with p value < 0.001 was considered as statistically highly significant.

Results

Table 1 displays the levels of serum lipid profile parameters TC, TG, HDL, VLDL, LDL and urea and creatinine in 2 different populations Group 1 control healthy and Group 2 MHD Patients. Average age of the control population and MHD population was 60.8 ± 11.2 and 62.5 ± 12.5 years respectively. There was no significant difference (p=0.0927) between the two populations with respect to age. Regarding the gender, males and females in control population were 59% and 41% respectively and in MHD population 86%and 14% respectively. Number of females were significantly less in MHD population compared to control population (p=0.0001). Number of males were significantly higher in MHD population (p=0.0001) compared to control population. Regarding urea and creatinine ,their levels were significantly high in MHD population (91.64 ± 40.44 mg/dl), (4.96 ± 2.03 mg/dl) compared to those of control population (30.2 ± 5.32mg/dl), (0.90 ± 0.27 mg/dl) (p=0.0001,p=0.0001).Regarding lipid profile, serum TG was significantly high in Group 2 MHD population (224.67 ± 52.01mg/dl)compared to Group1 control (137.14 ± 10.12mg/dl) (p=0.0001)and was above its normal range. Serum HDL was significantly low in Group 2 (33.28 ± 5.12mg/dl) compared to Group 1(48.01 ± 6.46 mg/dl) (p=0.0001) and was below the normal range. Serum VLDL was significantly high in Group 2 (50.41 ± 7.46) compared to that of Group 1 (28.94 ± 4.31) (p=0.0001) and its level was higher than its normal range. There was no statistically significant difference noted in the level of Serum LDL between group 1 and group 2 (p=0.2520) as its level

Table 1: Serum Lipid profile in 2 study groups.

N= 262	Normal Range	Group 1 Healthy Control N=130	Group 2 Patients on MHD N= 132	P Value and Significance
Age	46-75 years	60.8 ± 11.2	62.5 ± 12.5	0.0927
Male	NA	77 (59%)	114 (86%)**	0.0001
Female	NA	53 (41%)	18 (14%)**	0.0001
Urea	10-40 mg/dl	30.2 ± 5.32	91.64 ± 40.44 **	0.0001
Creatinine	0.6-1.4 mg/dl	0.90 ± 0.27	4.96 ± 2.03 **	0.0001
TC	<200 mg/dl	178.46 ± 9.73	181 .50 ± 8.16	0.1839
TG	150mg/dl	137.14 ± 10.12	224.67 ± 52.01**	0.0001
HDL	>40 mg/dl	48 .01 ± 6.46	33 ± 5.12**	0.0001
VLDL	<40mg/dl	28.94 ± 4.31	50.4 ± 7.46 **	0.0001
LDL	< 130mg/dl	101.40 ± 11.08	106.21 ± 6.50	0.2520

*Significant difference when compared with the control group (Significance at level p<0.05).

**Highly significant (Significance at level p<0.01).

was 106.21 ± 6.50mg/dl in Group 2 and 101.40 ± 11.08 mg/dl in Group 1. Besides, serum LDL level was within the normal range in both the groups. Regarding serum TC, its level was found to be within the normal range in both the Groups. Also, there was no significant difference in the level of serum TC between the Group 1 and Group 2. (p=0.1839) as its level was 181.50 ± 8.16 mg/dl in Group 2 and 178.46 ± 9.73 mg/dl in Group 1.

Discussion

Our Study population (Group 2) exhibited significant decrease in HDL. This may be due to diminished clearance and microinflammation [19,20] which may be due to their elevated urea level [21] and also may be due to decreased Apo A synthesis hence disturbances in reverse cholesterol transport [24]. Significantly increased level of TG noted may be due to the reduced activity of enzymes lipoprotein lipase and hepatic lipase [25] hence decreased rate of removal of TG from blood [26]. Significantly increased VLDL may be due to the reduced catabolism of TG rich lipoprotein hence accumulation of Triglyceride which is the main component of VLDL. [27]. This explains the increased incidence of coronary death as observed by Huang et al [28]. Significantly elevated urea and creatinine in MHD patients reflects renal failure, hence undergoing hemodialysis.

Conclusion

In our study of serum lipid profile in CRF patients on MHD, we have noted significantly increased level of TG, VLDL and decreased level of HDL. So, these parameters in MHD patients should be monitored and should be treated appropriately which may help in reducing their morbidity and mortality rate, thereby improving their quality of life.

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