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Study of Lipid Profile in Patients with Chronic Kidney Disease

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Abstract:
Introduction: *Chronic kidney disease (CKD) is a major health problem worldwide and cardiovascular disease (CVD) is the leading cause of death in chronic kidney disease (CKD). Recent studies showed that the oxidized low-density lipoprotein cholesterol and high- density lipoprotein cholesterol dysfunction occurs as kidney function declines and inflammation becomes more prevalent. HDL dysfunction might be an important predictive biomarker for the development and progression of atherosclerosis in CKD. Hence in this study we aimed to analyse the lipid profile and its association with renal dysfunction in CKD patients.*
Materials and methods*: A total of 37 subjects with CKD in the age group of 40 to 65 years who were admitted in medicine wards and undergoing dialysis in Nephrology unit, Rajah Muthiah Medical College and Hospital, were selected for the present study. A total of 17 normal subjects with were selected as controls. Blood samples were collected analysed for renal function, liver function, lipid profile, serum electrolytes and hamatogram. Statistical analysis was performed using student t test and results were compared with controls.*
Results*: In this study the mean (SD) age of subjects was 50.14(8.89) years. In our study we found that the urea, creatinine levels ($p<0.001$)were significantly increased. There is no significant difference in the lipid profile levels between control and CKD patients.*
Conclusion *: Malnutrition may aggravate the existing inflammation and worsen patients' outcomes by accelerating atherosclerosis . Henceforth the observed cholesterol levels in our study could be due to poor nutrition and may be a risk factor for CKD.*
Key word*: Chronic Kidney Disease, Dyslipidemia, HDL-cholesterol, LDL-cholesterol, HDL-LDL ratio*

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I. Introduction

Chronic Kidney Disease (CKD) is emerging to be a prominent non communicable disease. Global disease burden report of 2017 showed that CKD is having a prevalence of 9.1% and since 1990, the occurrence of CKD has raised by 29·3%. The world wide raise in death from CKD since 1990 was 41.5%.(1) The most frequent modifiable risk factors of CKD is hypertension, diabetes, anaemia like blood disorders, low birth weight, smoking and obese body mass index and non-modifiable risk factors like age, genetic factors and ethnicity.(2–6)

CKD is linked with dyslipidemia comprised of raised triglycerides and low HDL-cholesterol. In CKD there is down regulation of lipoprotein lipase and the LDL-receptor, and increased triglycerides due to delayed catabolism of triglyceride rich lipoproteins. CKD is associated with lower levels of apo A-I, decreased lecithin-cholesterol acyltransferase (LCAT) activity and increased cholesteryl ester transfer protein (CETP) activity which contribute to decreased HDL-cholesterol levels. Studies have found that higher total cholesterol (TC), higher non-HDL-cholesterol and lower HDL (HDL) were significantly associated with an increased risk of developing renal dysfunction.

The assessment of dyslipidaemia along with other variables is important for preventing further progression or formation of CKD. Hence, early determination and management of the risk factors for CKD patients play an important role to develop more effective screening and treatment strategies to decrease further mortality and morbidity in CKD patients. In addition to traditional risk factors for CVD such as older age, male gender, smoking, hypertension, diabetes, and hyper-lipidemia, non-traditional risk factors such as anaemia, inflammation , oxidative stress, mineral and bone abnormalities in CKD also should be monitored. Dys-lipidemia among CKD negatively influence the frequency and/or duration of hospitalizations. So this study was aimed to find the changes in lipid profiles among the subjects with CKD.

II. Methodology

A descriptive cross sectional study was conducted among CKD subjects who were admitted in the medicine wards and undergoing dialysis in Nephrology unit, Rajah Muthiah Medical College and Hospital, over a 6 month period. A total of 37 subjects with CKD in the age group of 40 to 65 years were selected for the present study. A total of 17 normal subjects were selected as controls. Venous blood samples were collected and analysed for renal function, liver function, lipid profile, serum electrolytes and hemogram.

The subjects who were in the renal replacement protocol were excluded from the study. Institutional ethical committee clearance was obtained and the subjects were recruited after detailed informed written consent. The collected data was tabulated and analysed using statistical softwares.

Statistical analysis was performed using student t test and results were compared with controls

III. Results

The mean (SD) age of subjects was 50.14(8.89) years. The minimum age was 40 and maximum was 72 years. Among the subjects 31(83.8%) were males and 6(16.2%) were females. Figure 1 shows the age categories and gender distribution among the population Table 1 shows the mean and standard deviation of biochemical parameters among the population.

Table: 1. Biochemical parameters among CKD patients and controls

Parameter	CKD Patients N=37	Control N=17	P Value
Blood sugar mg/dl	150.6 ± 66.1	89.76 ±13.507	0.001*
Urea mg/dl	98.3 ± 31.7	20.71±5.047	0.001*
Creatinine mg/dl	10.3 ±3.3	0.71±0.47	0.001*
Na+ mmol/L	139.5± 7.4	135.35±6.24	0.04*
K+ mmol/L	5.5±1.1	4.41±0.61	0.001*
Cl- mmol/L	98.6±2.4	97.65±4.0	0.001*
Total Bilirubin mg/dl	0.8±0.1	1.000±0.001	0.0018
Direct Bilirubin mg/dl	0.2± 01	0.000±0.002	0.001*
SGOT U/L	33.5±18.1	33.59±6.79	0.99
SGPT U/L	28.8±10.4	31.29±6.56	0.37
ALP U/L	170.5±60.3	82.59±31.12	<0.001*
Hb gm%	8.7±1.1	10.88±1.22	0.36
TWBC	7156.0±2743.8	4894.12±1592.74	0.87
Lymphocyte	236.3±1345.6	14.59±2.79	0.01*
Mixed	11.5±13.7	15.94±5.91	0.001*
Neutrophil	56.8±26.2	57.35±8.38	0.65
Platelets	263.54±164.045	286.00±102.50	0.43

Table 1 shows the values of Blood sugar, Urea, Creatinine, Electrolytes, Liver function tests in control and CKD patients. There was significant increase in the levels of Blood sugar, urea, creatinine in CKD patients compared to controls. Liver function tests were within the normal range. Haemoglobin was significantly less in CKD patients.

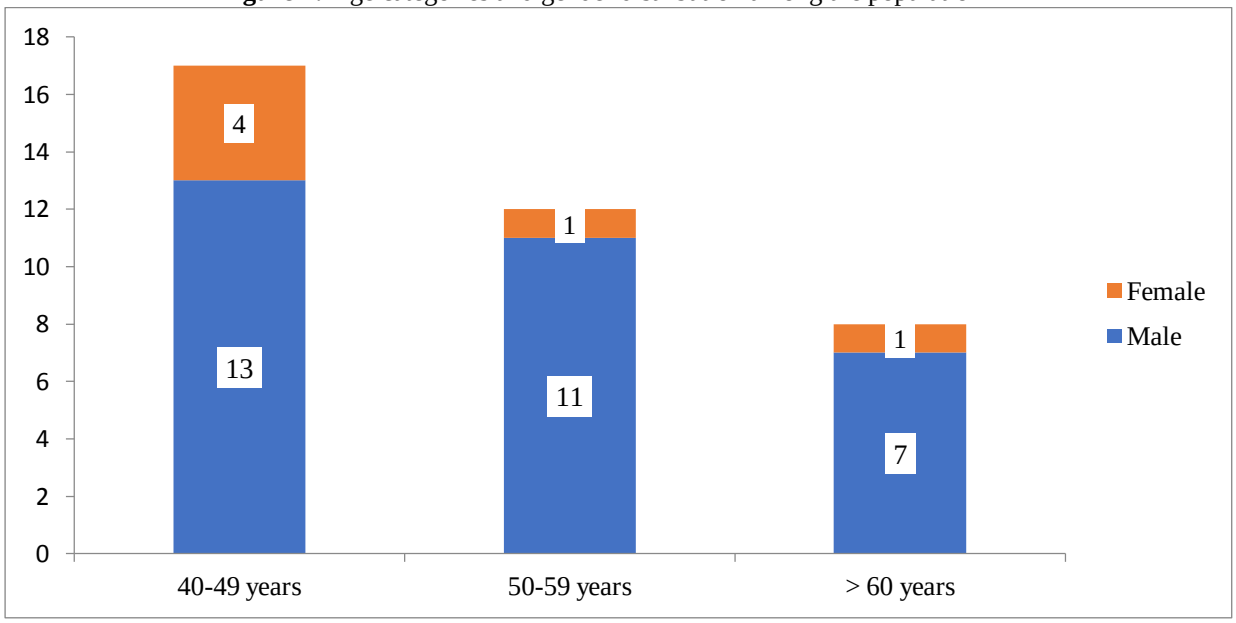
Table 2: Lipid profile levels among cases and controls

Parameter	CKD Patients N=37	Control N=17	p value
Total cholesterol mg/dl	130.2 ± 26.0	131.71 ± 37.03	0.25
TGL mg/dl	94.9± 25.1	74.18 ± 29.45	0.32
HDL mg/dl	37.70 ± 2.35	40.84± 3.08	0.06
LDL mg/dl	73.3± 15.21	69.02±9.90	0.29
HDL/LDL	0.59±0.19	0.56± 0.09	0.53

*- p value<0.05 is significant

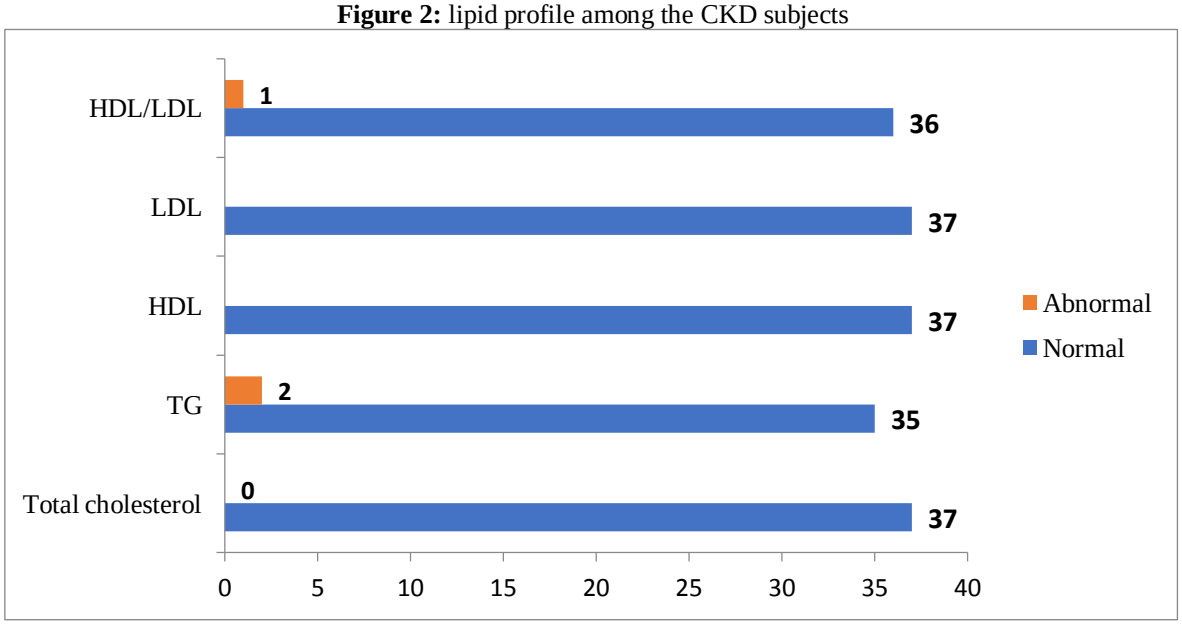
The above table shows the levels of Total cholesterol, triglycerides, HDL, LDL, HDL/LDL ratio among cases and controls. There was no significant difference among the two groups.

Figure 1: Age categories and gender distribution among the population



The association of Total cholesterol, TGL, HDL, LDL and HDL/LDL with gender and age was not significant (p value>0.05) .

Figure 2: lipid profile among the CKD subjects



The figure 2 shows the lipid profile among the subjects. The study showed no significant change in the lipid profile among the CKD patients.

IV. Discussion

The aim of the study was to assess the lipid profile among the CKD subjects. In the study the mean (SD) age of subjects was 50.14(8.89) years. The other studies showed the mean age to be lesser compared to this study. Adejumo et al (7) showed the mean age to be 46.98(16.81) years, 42.55(15.43) in a study by Ulasi et al (8), Nigerian study (9) showed mean age of 38.4 (12.6) years and Choudhary et al (10)showed mean age of 48.99 ± 16.74 among CKD patients.

In our study 31(83.8%) were males and 6(16.2%) were females. The increased male preponderance in CKD is seen among other studies also(7–9,11) The increased frequency of male subjects can be attributed to the more proportion of risk factors of CKD among males like diabetes, behavioural factors and hypertension. According to AHA, > 200 mg/dl for total cholesterol, > 150 for triglycerides, LDL > 130 mg/dl and < 35 mg/dl for HDL and > 0.4 for HDL / LDL ratio is considered to be abnormal.

The mean value of total cholesterol was 130.2 mg/dl and is lesser compared to other studies. Singh S et al showed 195.21mg/dl (11)and 182.34±45.01 in another study (9). Also we found the mean TGL was 94.9 mg/dl, HDL was 40.8 mg/dl , LDL was 73.3 mg/dl and HDL/LDL ratio was 0.6 in CKD subjects. There is no significant difference in the lipid levels between control and CKD patients. The observed lipid levels in our study may be attributable to low nutrition levels and inflammation. Several observational studies have shown an association between low total cholesterol and higher mortality in CKD and end-stage renal disease patients. (12) Malnutrition may aggravate the existing inflammation and worsen patients' outcomes by accelerating atherosclerosis (13–16).

V. Conclusions

The study showed that CKD patients have no significant alteration in the lipid profile. It has been suggested that low total cholesterol might represent a surrogate marker of bad prognosis in CKD patients.

Further studies on a long term basis are needed to identify the variation in the disease progress and its influence on CKD prognosis.

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