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STUDY OF SERUM LIPID PROFILE, LIPID RATIOS IN CHRONIC KIDNEY DISEASE(CKD) PATIENTS IN CHITTOOR

Biochemistry

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ABSTRACT

Cardiovascular disease is the leading cause of hospitalization and mortality in patients with chronic kidney.The rapid decline in renal function and the commencement of renal replacement therapy in CKD patients is associated with Dyslipidaemia. 120 subjects were taken in the study.The chief finding of the current study was that the Triglycerides was associated with an increased risk of CKD in men. Though, in women, none of the serum lipids and lipid ratios was associated with CKD. TG and TG/HDL-C ratio correlated negatively with eGFR in both genders.

KEYWORDS

Chronic Kidney Disease, Dyslipidemia, HDL, LDL, Cardiovascular Disease, Lipid Ratios,

INTRODUCTION:

One of the important cardiovascular risk factors responsible for cardiovascular disease and the rapid progression of chronic kidney disease (CKD) to end-stage renal disease is Dyslipidaemia. An important aspect ofthe reduction of cardiovascular complications and retardation ofthe progression of CKD is early detection and management of dyslipidemia. The leading cause of hospitalization and mortality in patients with chronic kidney disease is Cardiovascular complications[1] The process ofcardiovascular disease most likely starts in the early stages of CKD when its severity is considered at commencement of (RRT).[2]A rapid decline in renal function and commencement of renal replacement therapy in CKD patients is associated with Dyslipidaemia[8,9] The precise mechanism is unknown, but it has been postulated theory says that mesangial cells bind and then take up oxidized LDL which later causes injury to mesangial, epithelial and endothelial cells by supporting enlistment of inflammatory cells such as macrophages which cause cytokines, chemokines and growth factors release[10,11].This consequently leads to glomerulosclerosis[10]. Podocyte injury and mesangial sclerosis are also seen which are due to Hypercholesterolaemia and hypertriglyceridemia, afterward leading to glomerulosclerosis. Elevated triglyceride (TG), elevated total cholesterol (TC), (LDL-C) and reduced high-density lipoprotein cholesterol are characters of Dyslipidaemia in CKD patients (HDL-C). [5-7]. Dyslipidaemia being a modifiable cardiovascular risk factor, can be managed with early diagnosis, lifestyle modification, and lipid-lowering medications which in turn will reduce cardiovascular disease risk and progression of CKD to end-stage renal disease (ESRD). It has been reported that statins used for Treatment of dyslipidemia reduce the rate of decline in glomerular filtration rate (GFR) in CKD patients[13]. This study was done to work out the prevalence and pattern of dyslipidemia in relevance age, gender, and severity of CKD among pre-dialysis CKD patients.

MATERIALS AND METHODS:

60 consecutive pre-dialysis CKD patients that fulfilled criteria for the study and 60 age and sex-matched controls are taken. Inclusion criteria for CKD subjects are adults patients with CKD stages 1-5 yet to commence dialysis. Those who had a renal transplant and those on dietary restriction, lipid-lowering medications, steroids, or immunosuppressants are excluded from the study. Inclusion criteria for control subjects were adults aged ≥18 years who are neither hypertensive nor diabetic with normal renal function, females who are not pregnant and not on steroids, immunosuppressant, or lipid-lowering medications. Patients are interviewed, examined for renal disease. Weight and height were measured. Body mass index (kg/m^2) is calculated using the formula [Weight (kg)/Height (m)^2]. Fasting venous blood is obtained from patients to perform biochemical tests which included serum creatinine and fasting serum lipids. Total serum cholesterol and triglycerides are determined by enzymatic estimation,[16] while HDL-C was determined by precipitation[17]. LDL-C is estimated using Friedwaldformula.[18]

Glomerular filtration rate is estimated using the Cockcroft Gault formula

CCr={(l40–age) x weight)/(72xSCr)}x 0.85 (if female)

Definition Of Variables

Obesity is defined as BMI > 29.9kg/m^{220}.

STAGES OF CKD:

·stage 1 (GFR ≥ 90 ml/min with evidence of kidney damage),
·stage 2 (GFR 60-89 ml/min with evidence ofkidney damage),
·stage 3 (GFR = 30-59 ml/min with or without evidence of kidney damage),
·stage 4 (GFR =15-29 ml/ min with or without evidence of kidney damage)
·stage 5 (GFR < 15ml/min with or without evidence of kidney damage). [21].

Dyslipidaemia is defined as any or a combination of the following:

TC >200 mg/dl, HDL-C < 50 mg/dl in females and < 40 mg/dl in males, LDL-C > 135 mg/dl and TG > 150mg/dl.[22]

P value < 0.05 was taken as statistically significant. We used mean ± standard deviation to describe continuous variables with a normal distribution and medians and interquartile ranges for skewed distributed variables. Frequencies and percentages were used to indicate categorical variables. The clinical characteristics of the study population were listed. We also compared the characteristics of male and female subjects. Student's T test or rank-sum test was used for continuous variables and the chi-squared test for categorical variables.

RESULTS:

Table 1: Clinical Characteristics Of Male And Female Subjects.

CLINICALCHARACTERISTICS	Total (*n*=120)	Male (*n*=45)	Female (*n*=75)	*P*value
Age(Years)	50±13	50±13	50±14	0.29
Waistcircumference(cm)	83±10	86±10	81±10	<0.001
HistoryofHypertension(%)	372(20.28)	166(24.45)	206(17.84)	0.001
HistoryofDiabetes(%)	115(6.27)	48(7.07)	67(5.80)	0.29
HistoryofCoronaryheartdisease(%)	42(2.29)	23(3.39)	19(1.65)	0.27
Physicalinactivity(%)	1013(55.23)	374(55.08)	639(55.32)	<0.001
Systolicbloodpressure(mmHg)	129±20	130±19	127±21	0.003

Diastolicbloodpressure(mmHg)	78±11	80±11	77±11	<0.001
eGFR (mL/min/1.73m^2)	99±22	92±20	104±22	<0.001
ACR(mg/g)	8.49 (5.75–14.23)	9.54 (6.63–15.56)	6.81 (4.59–11.46)	<0.001
Fastingglucose (mg/dl)	82±15	80±12	78±16	0.10
CKD	235(12.81)	83(12.22)	152(13.16)	0.56

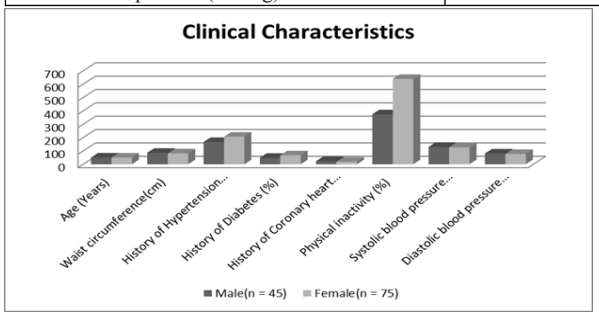
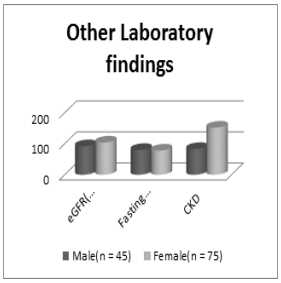


Fig 1: Clinical Characteristics Of Male And Female Subjects

Table 2: Other Laboratory Finidings

OTHER LABORATORY FINDINGS	Total (*n*=120)	Male (*n*=45)	Female (*n*=75)	*P*value
Serumcreatinine (mg/dl)	0.8±0.14	0.9±0.16	0.7±0.12	<0.001



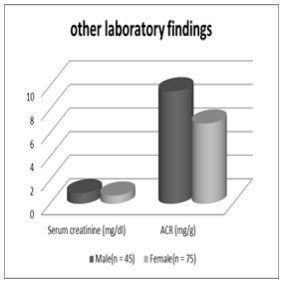
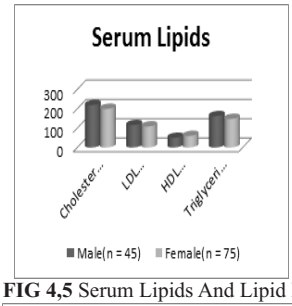


FIG 2,3: Other Laboratory Findings

Table 3: Serum Lipid Values In Males And Females

SERUMLIPIDS	Total(*n*=120)	Male(*n*=45)	Female(*n*=75)	*P*value
Cholesterol(mg/dl)	215±56	219±53	220±58	0.09
LDL(mg/dL)	115±23	116±20	117±18	0.19
HDL(mg/dl)	55±8	52±7	56±8	<0.001
Triglycerides(mg/dl)	149±23	157±15	152±19	<0.001
LDL/HDLratio	2.09(1.67–2.59)	2.23(1.81–2.76)	2.08(1.60–2.48)	<0.001
TG/HDLratio	2.76(1.35–2.84)	3.01(1.68–3.25)	2.71(1.17–2.86)	<0.001
TC/HDLratio	3.90(3.01–4.15)	4.21(3.23–4.38)	3.92(2.92–4.05)	<0.001
Dyslipidemia	1474(80.37)	556(81.89)	918(79.48)	0.21



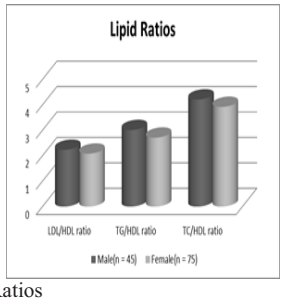


FIG 4,5 Serum Lipids And Lipid Ratios

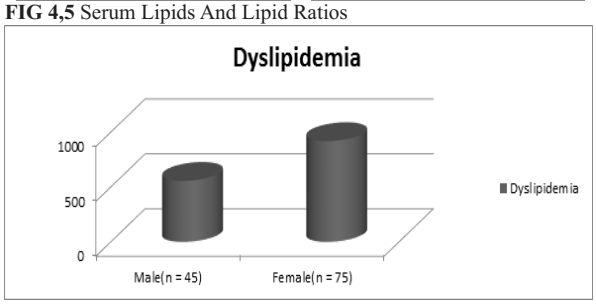


FIG 6 Dyslipidemias In Males And Females

TC:totalcholesterol;TG:triglyceride;LDL-C: low-density lipoprotein cholesterol; HDL-C: high-density lipoprotein cholesterol; eGFR: Estimated glomerular filtration rate; ACR: Urinary albumin to creatinine ratio; CKD: chronic kidney disease.

A total of 120 subjects (the mean age was 50 ± 13 years) were included in the analysis.

Men had a significantly larger waist circumference, a higher SBP, and a higher DBP than women. Women had a higher level of eGFR than men, but there was no significant difference in the prevalence of CKD between men and women. In the past three months, no subjects used contrast agents or antibiotics. The proportions of current smokers and current alcohol use were significantly higher in men.

Men had a higher TG/HDL-C ratio, a higher TC/HDL-C ratio, and a higher LDL-C/HDL-C ratio than women and all of these differences were significant ($P < 0.05$). Men also had higher serum TGs and lower HDL-Cs than women.

DISCUSSION:

The chief finding of the current study was that the Triglycerides was associated with an increased risk of CKD in men. Though, in women, none of the serum lipids and lipid ratios was associated with CKD.

TG and TG/HDL-C ratio was negatively correlated with eGFR in both genders. In women, the serum lipids and lipid ratios didn't correlate with albuminuria.

Many previous studies have shown that an important role in the pathogenesis and progression of kidney disease is played by both a high level of cholesterol and triglyceride [23,24]. Hypercholesterolemia inducing a pro-inflammatory response and resulting in macrophages recruitment was found in many rat models [25].Both hyperlipidemia and macrophage inflow appear to lead to the beginning of glomerulosclerosis.

It appears that food restriction can preclude hypertriglyceridemia induced glomerular injury and macrophage influxas observed in obese Zucker rats. Many of these studies have indicated that dyslipidemia can add to kidney damage. Dyslipidemia is also an independent risk factor for the evolution of kidney disease in patients with diabetes.

Samuelsson et al.'s study[26] indicated that TC, LDL-C, and triglyceride-rich apoB-containing lipoproteins contributed to a more rapid decline in renal function when 73 non-diabetic patients with CKD were followed for an average of 3.2 years. It was shown that hypertriglyceridemia and low HDL-C were associated with the incidence of CKD, where the models were only adjusted for variables like age, gender, and race in the Atherosclerosis Risk in Communities study after 9 years' follow-up.

In the present study, the incidence of CKD in men was associated with TG, but CKD in women was not associated with all of the serum lipids and lipid ratios.

Kim et al. predicted CKD in Korean populations using lipid ratios.

The results showed that CKD in both men and women is associated with an altered TG/HDL-C ratio.

However, in the present study, there is no significant association of lipid ratios with CKD in the population. Though hyperlipidemia and hypercholesterolemiaare independent risk factors for the progression of kidney disease, there is no conclusive evidence that demonstrates that isolated hyperlipidemia can lead to CKD in healthy individuals. Hyperlipidemia can be accompanied by coronary heart disease, diabetes, and hypertension.

Some results support lipid-lowering therapy in patients with CKD, diabetes, and coronary heart disease.

CONCLUSION:

In the present study, both TG and TG/HDL-C ratio negatively correlated with eGFR in both genders.

There are several limitations of the current study that need to be acknowledged.

Firstly, this is only a cross-sectional study. There might be increased atherogenicity of LDL-C related to heavy proteinuria or end-stage renal disease according to previous studies.

Secondly, albuminuria and eGFR were not measured repeatedly.

Thirdly, individuals who were included were those who responded to an invitation, this might lead to a selection bias. Participation willingness might be higher in those individuals having more comorbidity.

STATEMENT OF FUNDING: No funding has been received for doing this study.

CONTRIBUTION OF AUTHORS:

STATEMENT OF CONFLICT: I/We (Authors) have no conflict of interest.

ETHICS STATEMENT:

This study was approved by the Institutional ethics committee of the Apollo Institute Of Medical Sciences And Research Chittor, Apollo Medical College. Written informed consent was obtained from all subjects.

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