

**A STUDY ON LIPID PROFILE IN CHRONIC KIDNEY DISEASE PATIENTS**Dr. V. Viknesh\*<sup>1</sup>, Dr. Vigneshwar M.<sup>2</sup>, Dr. M. J. Jacob<sup>1</sup>Postgraduate in General Medicine, <sup>2</sup>Assistant Professor, <sup>3</sup>Professor  
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- Cardiovascular disease(CVD)is a major cause of mortality in patients with mild to moderate chronic kidney disease(CKD) and end-stage renal disease(ESRD).<sup>[1,2]</sup>
- Primary care physicians(PCP) often manage patients with CKD in the early stages of the disease and have a pivotal role in affecting long term outcomes in CKD patients related to cardiovascular and all-cause mortality.<sup>[7]</sup>
- In a retrospective cohort study only a tiny minority of patients (0.5–1%) with mild to moderate CKD developed ESRD over a 5-year follow up, while as many as 19 and 24% of the patients with mild and moderate renal insufficiency, respectively, died mostly of cardiovascular complications in the same period.<sup>[4]</sup>
- Hyperlipidemia, one of the important risk factor of atherosclerosis, is an abnormality commonly encountered in patients with chronic kidney disease.
- Other risk factor includes hypertension, diabetes mellitus, smoking, and obesity.
- Indian studies on lipid profile abnormalities in chronic renal failure (CRF) have varied from no abnormalities at all to significant abnormality (Hypertriglyceridemia and reduced HDL) as described in the Western literature. (NKF/DOQI) guidelines, which plays a vital role in development of atherosclerotic cardio vascular disease.
- There is also associated thyroid dysfunction seen in CKD patients. A few reports have appeared from India, where various parameters of thyroid function were measured in patients with CRF. In order to gain further insight, this study included measuring the Thyroid Stimulating Hormone(TSH) levels.

**Aims and objectives of the study**

1. To identify lipid pattern in chronic kidney disease patients.
2. To analyze lipid alterations that can occur in Chronic Kidney Disease patients.
3. To study the correlation between renal function and lipid abnormalities in Chronic Kidney Disease.

**Etiology**

- Diabetes has emerged as the most frequent cause (30–40%) followed by hypertension (14–22%), CGN(16–20%), CIN(5.4–12.7%), hereditary disease(8.4%) and obstruction including calculus (2.9%).<sup>[11]</sup>
- Other causes include Primary glomerular diseases like Membranous nephropathy, IgA nephropathy, Focal and segmental glomerulosclerosis (FSGS) and Membrano proliferative glomerulonephritis.
- Vascular causes are renal artery stenosis, vasculitis, atheroemboli and Hypertensive nephrosclerosis.

- The Causes for tubulo interstitial disease includes Drugs (e.g., sulfa, allopurinol), Infection (viral, bacterial, parasitic), Heavy metals and Radiation nephritis.

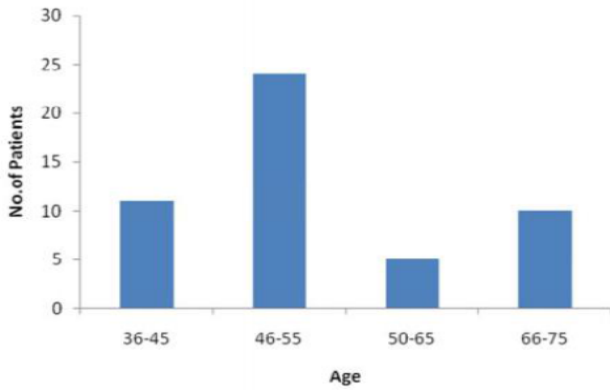
**MATERIALS AND METHODS**

- This study was conducted in 50 patients with chronic kidney disease and 50 normal people taken as controls.
- All the patients in this study group were selected from those who were admitted to department of General medicine in MVJMC & Research hospital Bengaluru.

**RESULTS AND OBSERVATIONS****Age distribution**

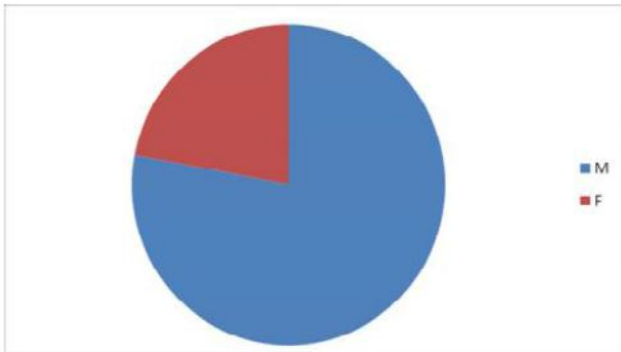
- Age of the patients varied from 40 yrs to 75 yrs. Majority of patients
- fall in the age group between 46-55 years.

**Age distribution in patients**



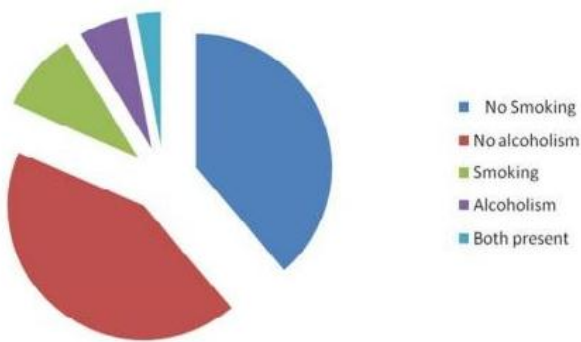
**Sex distribution**

Males constitute 39(78%) and females constitute 11(22%) in this study.



**Personal habits**

In this study 10 patients of the patients were smokers and 6 patients were alcoholics.



**Renal parameters**

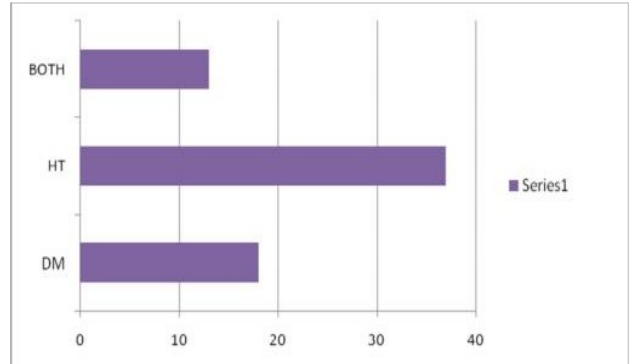
- Lowest urea value found in these patients was 38 and the highest was 157mg/dl.
- Creatinine values ranged between 1.3 mg/dl to 13.7 mg/dl.

GFR	No. of patients
<15ml	11
15-29ml	8
30-59ml	11

**Blood pressure readings**

Patients with blood pressure of more than 140/90 were considered hypertensives. Most patients (36 patients) were hypertensives at the time of presentation. Only 14 patients had blood pressure less than 140/90mmHg.

**DIABETIC STATUS** It was found that 18 patients were diabetic.



**Radiological examination**

- Radiological examination was done by abdominal ultra sonogram.
- In 39 patients the kidney size was less than 9cm in one or both kidneys.

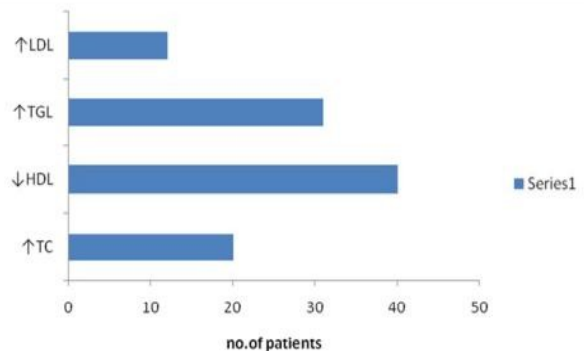
**ECG results**

- Patient's electrocardiograms were analysed. It was found that 17.
- patients showed left ventricular hypertrophy. 16 patients showed ischemic changes. One patient had tall peaked T waves.

Type of ECG changes	Males	Females	Total
LVH	15	2	17 (34%)
Ischemic changes	12	4	16 (32%)

Ckd patients showed the following lipid disorder.

Type of lipid Disorders	NO OF PATIENTS
Elevated Cholesterol	20
Decreased HDL	40
Elevated Triglycerides	31
Increased LDL Cholesterol	12



**Lipid pattern in pattern****HDL pattern**

Serum HDL values ranged between 23mg/dl to 46mg/dl. Patients showed abnormal HDL levels (<40 mg/dl) were 40. Its mean value was 35.08 and standard deviation was 4.84. The P value is <0.01. Among the control groups, the lowest value of HDL was 36 mg/dl and the highest was 58 mg/dl. Their mean was 46.96 and standard deviation was 5.59. P value, <0.01

It showed that there was a significant reduction in HDL-C levels in patients with CKD than that of controls.

**LDL pattern**

- Lowest value of LDL 52mg/dl and the highest value were 189mg/dl.
- Abnormally high LDL levels (>130mg/dl) were found in 12 patients. Their mean value was 188.78 mg/dl and standard deviation was 5.680 and P value was < 0.01 significant. For controls lower value is 76mg/dl, highest value is 126mg/dl their mean was 105.58 and standard deviation is 12.59 and P value was <0.01 which is significant.

**TGL pattern**

TGL value in our study group ranged between the minimum of 73 mg/dl and the maximum of 313mg/dl. TGL levels were abnormal in 31 patients >160mg/dl. Mean and standard deviation of study group were 165.04 and 50.8. In controls, the lowest value is 70 and the highest is 170mg/dl. The mean and standard deviation were 117.68 and 17.43. P value was significant (P < 0.01) in both the groups.

**Total cholesterol**

Range of TC levels in study group was 120mg/dl to 280 mg/dl.

Lowest value in control group was 143 and the highest value was 220mg/dl. Total cholesterol was more than 200mg/dl in 20 patients. The mean values and standard deviations of study group were 188.78 and 40.16. In the control group. The mean values and standard deviations of were 117.68 and 17.43. P value was (P<0.01) significant in both the groups.

Correlation between lipid fractions and gfr in patients.

LIPIDS	eGFR<15ml	15-29ml	30-59ml
TC ↑	5	12	3
TGL ↑	5	19	7
HDL ↓	8	23	9
LDL ↑	3	6	2

**Tsh level**

TSH level increased in 16 patients in this study.

**DISCUSSION**

In my study, most common lipid abnormalities found were Low HDL levels and Hypertriglyceridemia.

**Decreased high density lipoprotein levels**

The low HDL levels in patients with chronic kidney disease in our study were consistent with Diana M Lee LG et al 43 who studied the lipid profile in CRF patients. This low HDL cholesterol levels was also an independent risk factor for the development of CKD in the Framingham off spring study. Several mechanisms may underlie these reductions in HDL cholesterol levels, which is usually an indication of impaired reverse cholesterol transport.

Apo AI, which is the activator of lecithin cholesterol acyltransferase (LACT), is reduced in CKD due to down regulation of hepatic Apo AI genes leads to decline in the activity of LACT, which causes reduced cholesterol esterification and impairment of HDL maturation. The activity of LACT is consistently diminished in CKD, so there is decrease in HDL levels.<sup>[44]</sup>

In MDRD study 55 low HDL levels in CKD patients were one of the independent risk factor for progression of kidney disease. In our study the mean value was significantly less than the age matched healthy controls.

**Elevated triglycerides**

Triglyceride levels were significantly elevated in our study than control group. Abnormal triglyceride values were found in 31 of patients in our study. The present study demonstrates that CRF is commonly accompanied by lipid abnormality in the form of hypertriglyceridemia.

This is similar to the observations made in Western studies and recent Indian studies 45,46,47,48 by Gupta DK, Das BS and Bagdae J. Elevated triglyceride levels are due to impaired activity lipoprotein lipase (LPL) and direct inhibitory effect of various uremic 'toxins' on the enzymes involved in lipid metabolism<sup>50</sup> represent the most important pathophysiological mechanisms underlying the development of hypertriglyceridemia in renal failure.

Chan MK et al (48) also found hypertriglyceridemia was the major abnormality in their studies. Hypertriglyceridemia represents an early feature of renal failure.

**Elevated low density lipoprotein**

LDL was significantly elevated than that of controls in our study.

We found that 12 of patients showed elevated LDL levels. Most studies find that Uremic Patients usually have normal or slightly reduced concentrations of LDL-C levels and they exhibit important disturbance in the density distribution of LDL sub fraction that is characterized by a predominance of small dense LDL

particles.<sup>[51]</sup>

In the present study we find significantly high levels of LDL cholesterol in the group with GFR 15-29 ml.

#### Total cholesterol

Total cholesterol levels were elevated in 20 patients in our study group heavy proteinuria alone or in combination with chronic renal insufficiency results in acquired LDL receptor deficiency, which plays a central role in the genesis of the associated hypercholesterolemia.<sup>[53]</sup>

#### Correlation Studies

- It was found that abnormal serum triglycerides, TC, HDL, were
- found to be increased significantly in the group of eGFR between 15-29 ml

#### ECG changes

- Out of 50 patients, 17 (34%) of patients showed changes suggestive of LVH and 16 (32%) of patients showed ischemic changes. The risk of dying of cardiac complications is 65 times higher in dialysis patients between 45-54 years and 500 times higher than the general population.
- The risk factors which are responsible for increased morbidity and mortality were hypertension, DM, high LDL, low HDL and smoking.

#### CONCLUSION

1. HDL-C levels were lower and triglycerides, total cholesterol and TGL levels were higher in the study group compared to controls.
2. There is a statistically significant increase in serum triglycerides level in patients with CKD stage 3, 4 and 5.
3. Predominant lipid abnormalities were reduced HDL-C levels and elevated TGL.
4. There was a negative correlation exists between serum HDL-C level and GFR levels which was statistically significant.
5. Significant number of patients showing ECG changes of left ventricular hypertrophy 34 % and ischemic changes 32%.

#### Limitations of the study

1. Smoking, alcoholism and diabetics may alter the lipid pattern in the body. Their influences in the study group also have to be considered.
2. Since we had not analysed the echocardiogram of the patients, the real scenario of ischemia in CKD patients was not known.
3. We had not estimated the lipid abnormalities in patients who underwent dialytic treatment or renal transplantation.

#### ACRONYMS

- Apo - Apolipoprotein
- BP - Blood Pressure

- CGN-chronic glomerulonephritis
- CIN-chronic interstitial nephritis
- CKD - Chronic Kidney Disease
- CVD - Cardio Vascular Disease
- DM - Diabetes Mellitus
- ECG - Electro Cardiogram
- ESRD - End Stage Renal Disease
- GFR - Glomerular Filtration Rate
- HDL-C - High Density Lipoprotein Cholesterol
- HTN - Hypertension
- ID No - Patient identification Number
- K+ - Potassium
- K/DOQI - Kidney Disease Outcome Quality Initiative
- LCAT - Lecithin Cholesterol Acyl Transferase
- LDL-C - Low Density Lipoprotein Cholesterol
- LK - Left Kidney
- LPL - Lipoprotein Lipase
- LVH - Left Ventricular Hypertrophy
- MDRD study - Modification of Diet in Renal Disease study

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