

ORIGINAL RESEARCH

Study of lipid profile and ecg changes in patients on maintenance haemodialysis

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Abstract

Background: With increasing prevalence of Chronic Kidney Disease (CKD), CKD related cardiovascular diseases (CVD), end stage renal disease (ESRD) and the consequent financial burden of renal replacement therapy (RRT), the importance of CKD and its risk factors needs to be considered.

Hence, lipid profile was studied in maintenance haemodialysis (MHD) subjects

Aims and objective: The present study was conducted in the Department of General Medicine in Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. The objectives of the present study are:

1. To study the prevalence of dyslipidaemia, its correlation with kidney function in patients on maintenance haemodialysis and identify the lipid pattern in patients on maintenance haemodialysis.

2. To study the ECG changes in patient on maintenance haemodialysis.

Method: The patients were selected from those who got admitted to department of General Medicine. After obtaining an informed and written consent, they were included in this study group and were subjected to lipid profile, rft and ecg.

Results: There is significant difference of lipid profile among CKD patients on maintenance haemodialysis. It is already known that dyslipidaemia is a risk factor for chronic kidney disease. And our study also shows a significant rise in triglyceride levels and fall in HDL levels among patients on maintenance haemodialysis.

Keywords: dyslipidaemia, maintenance, haemodialysis

Introduction

The number of cases of CKD are rising exponentially in the developing countries of Asia. The prevalence of Chronic Kidney Disease (CKD) in India is 0.8%¹. DM (30-40%) is the most important cause. An increase in complications like anemia, peripheral neuritis, thyroid dysfunction, dyslipidaemia, and CVD lead to further deterioration of CKD².

Chronic kidney disease (CKD) has emerged as one of the most prominent causes of death and suffering in the 21st century. Due in part to the rise in risk factors, such as obesity and diabetes mellitus, the number of patients affected by CKD has also been increasing, affecting an estimated 843.6 million individuals worldwide in 2017³.

In CKD, rapidly progressive atherosclerosis leads to cardiovascular diseases due to several reasons mostly because of abnormalities in lipoprotein metabolism involving all lipoprotein classes. It is hypothesized that lipid abnormalities can cause kidney damage and lead to the advancement of renal failure as well. It may be due to damage to different cells of the kidney like glomerular capillary endothelial cells, mesangial cells, and podocytes.

Pathophysiology of Dyslipidaemia in CKD and Dialysis

Patients on dialysis and those with CKD have a different dyslipidaemia spectrum from the general population. Major qualitative alterations in lipoproteins, such as oxidation and modification to sdLDL, which makes the particles more atherogenic, can be seen in addition to quantitative variation⁴.

Hypertriglyceridemia

High-Density Lipoprotein

In comparison to nonuremic people, patients with CKD often have lower plasma HDL cholesterol concentrations. The impaired reverse cholesterol transfer from peripheral cells to the liver as a result of the HDL particles' diminished capacity to carry cholesterol burdens the vasculature with cholesterol and encourages atherosclerosis⁵.

Low-Density Lipoprotein

Although elevated plasma LDL cholesterol concentration is a frequent symptom of nephrotic syndrome, it is uncommon in patients with severe CKD, particularly those who are taking HD. But in CKD patients and dialysis patients, there are qualitative alterations in LDL. sdLDL and IDL proportions rise, which is thought to be particularly atherogenic. A variant of LDL called sdLDL has a strong potential to enter blood vessels, oxidise, and start the atherosclerotic process⁶.

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in patients with chronic kidney disease (CKD) and with end-stage renal disease. CKD has a strong association with dyslipidaemia. Dyslipidaemias can affect kidney function and increase the risk for CVD development, so it is an important risk factor. The factors contributory to cardiac abnormalities include anemia, hypertension (HTN), volume overload, ischemic heart disease, uremic cardiomyopathy, electrolyte imbalance, hyperlipidaemia, and arteriovenous fistula⁷.

Patients on dialysis frequently have high-grade ventricular ectopic activity and Non sustained ventricular tachycardia, especially right before a session⁸. It is therefore possible that risk assessment tests employing resting ECG that examine these crucial variables (ST, T-changes, ventricular arrhythmia, QTC, and QRS length) might be utilised to pinpoint dialysis patients at risk of CV morbidity and death.

Aim and objectives

The present study was conducted in the Department of General Medicine in Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. The objectives of the present study are:

1. To study the prevalence of dyslipidaemia and identify the lipid pattern in patients on maintenance haemodialysis along with its correlation to kidney function.
2. To study the ECG changes in patient on maintenance haemodialysis.

Materials and methods

The research was carried out as a part of a prospective cohort study for a duration of 18 months with a sample size of 100 participants which included:

1. 50 patients on maintenance haemodialysis falling in the age group of 20 years to 80 years.
2. 50 healthy adult whose age group compared well with that of the study group (control group).
3. The patients above 20 with established CKD on maintenance haemodialysis who consented to be a part of the study were included.

Exclusion criteria

Patients with Acute renal failure, nephrotic syndrome, Patients taking beta agonist, pregnant female as well as those with acute or chronic infection were excluded from the study.

Investigations related to study

The various parameters like lipid profile, blood urea nitrogen, and ECG changes were analysed.

Statistical analysis

Data obtained was analysed by SPSS (Statistical package for the social sciences) Software. Results was interpreted using suitable diagrams, charts, bars and figures.

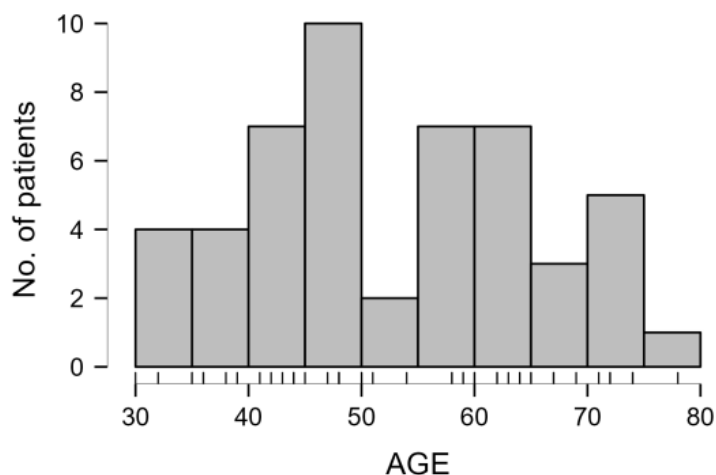
1. Mean and standard deviations was calculated for quantifiable variables.
2. For qualitative variables, percentage and proportion was calculated. Chi square test also applied for qualitative variables.

Ethical consideration

Informed and written consent (in the language best understood) was taken from each participant before collecting data. Only those individuals, who volunteered to participate in the study were included and the data was kept confidential. The study was approved by the Institutional Ethical Committee. It did not impose any burden on the subjects and the Institute

1. Distribution of patients based on age

Mean age of cases of our study was 53.54 ± 12.58 years. Range was 48 with minimum age was 30 and maximum age was 78 years



Mean age of control population

Mean age of controls of our study was 53.34 ± 14.468 years. Range was 63 with minimum age was 23 and maximum age was 87 years

2. Laboratory value in study**Table 2: Laboratory value in cases**

Laboratory value	cases		Control	
	Mean	SD	Mean	SD
Creatinine	10.087	5.453	1.154	0.203
Urea	170.940	93.679	34.840	6.498
Egfr	6.814	4.073	71.760	19.616
Triglyceride	182.100	63.120	151.320	98.417
Cholestrol	144.520	44.163	141.600	47.044
Hdl	28.780	11.99	35.960	16.839

3. Comorbidity among patients

Comorbidity	Cases	control
Hypertension	25	8
Diabetes	7	8
Hypertension + diabetes	15	10
Polycystic kidney disease	2	0
Hypothyroid	1	0

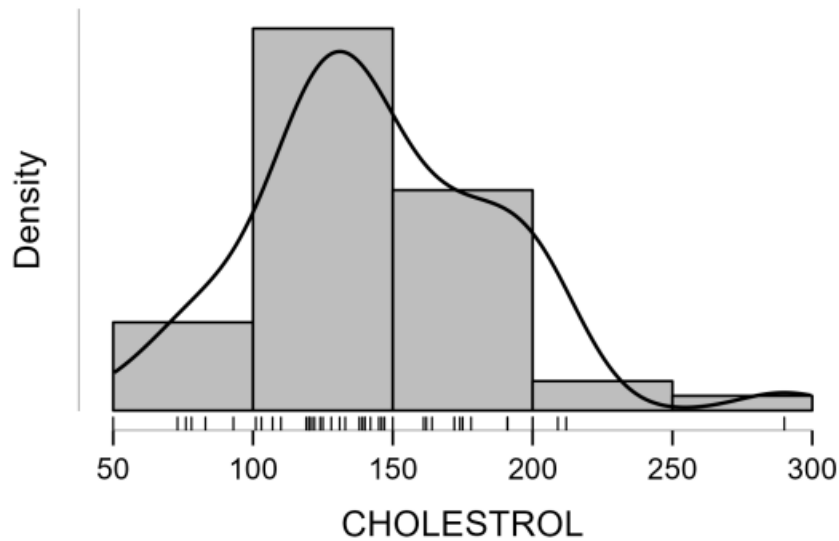
In present study, we found that hypertension is the most common comorbidity among cases of our study. In present study, most of controls patients had alcoholic liver disease. Hypertension was present in 8 patients while diabetes was also present in 8 patients. 10 patients had diabetes and hypertension combined

Prevalnce of dyslipidemia**4. Triglyceride level among study group**

Mean triglyceride level among cases was 182.1 ± 63.12 . Minimum value of 49 and maximum value of 319. We found that hypertriglyceridemia was seen in 72% of cases while normal triglyceride level was seen in 28% of cases. Mean triglyceride level among controls was 151.32 ± 98.417 . Range is 433 with minimum value of 46 and maximum value of 479. We found that hypertriglyceridemia was seen in 34% of controls while normal triglyceride level was seen in 66% of cases.

5. Cholesterol level among study group

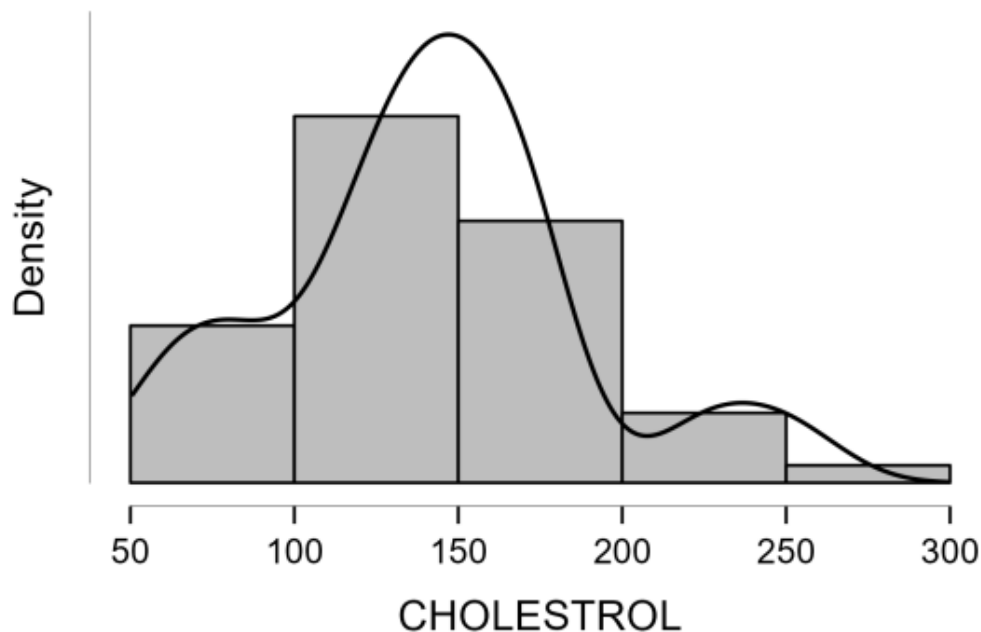
In present study we found that hypercholesterolemia was seen in 6 % of cases while normal cholesterol level was seen in 94% of controls

Stratification of serum choleostrol level among cases

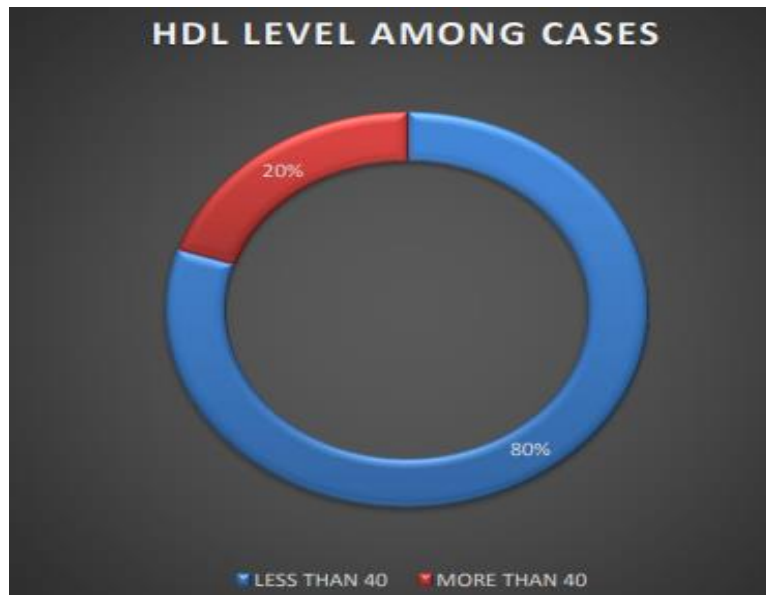
Maximum number of patients were in 100-150 range

Prevalence of hypercholesterolemia among controls

In present study, we found that hypercholesterolemia was seen in 10 % of controls while normal cholesterol level was seen in 90% of controls. Maximum number of patients were in 100-150 range.

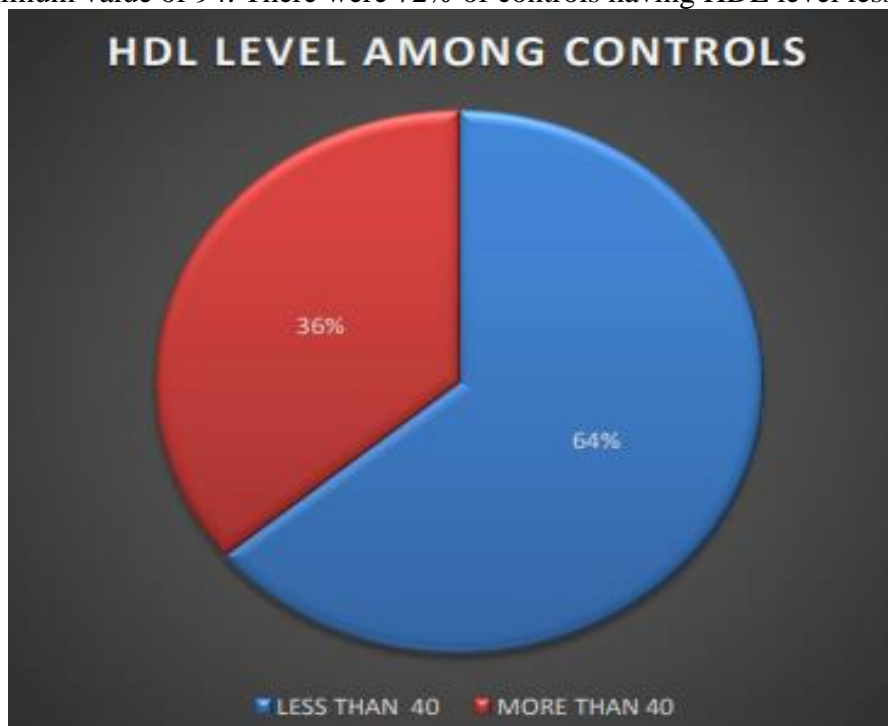
Stratification of cholesterol level among controls**7. Hdl level among study group**

Mean HDL level among cases was 28.78 ± 11.994 . Range is 57 with minimum value of 13 and maximum value of 70. There were 80% of cases having HDL level less than 40.



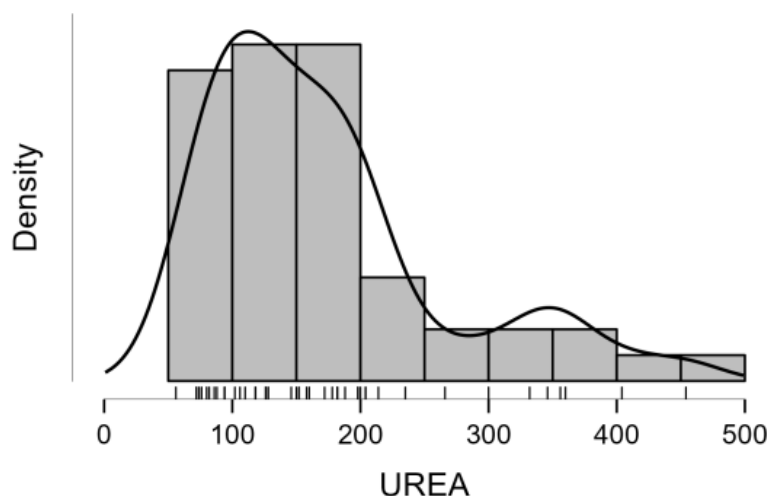
Hdl level among controls

Mean HDL level among controls was 35.96 ± 16.839 . Range is 84 with minimum value of 10 and maximum value of 94. There were 72% of controls having HDL level less than 40.



8. Blood urea level among study group

Mean blood urea level among cases was 170.940 ± 93.679 . Minimum value of 56 and maximum value of 454.

Stratification of blood urea level among cases

Maximum number of patients have blood urea level in 100-200 range

Blood urea level among controls

Mean blood urea level among controls was 38.84 ± 6.498 . Minimum value of 20 and maximum value of 45.

9. Ecg changes among study group**Table 10a: Ecg changes among cases**

<u>Ecg changes</u>	<u>No. Of patients</u>
Low voltage	5
LVH	9
Tachycardia	4
Normal	13
Left bundle branch block	4
T wave inversion	1
Q wave	1
LAD	5
RVH	1
Atrial fibrillation	2
Right bundle branch block	1
PR prolonged	1
Sinus bradycardia	2
Arrhythmias	1

Table 10b: ecg changes among controls

<u>Ecg changes</u>	<u>No. Of patients</u>
Low voltage	0
LVH	6
Tachycardia	3
Normal	31
Left bundle branch block	2
T wave inversion	1
Q wave	0

LAD	2
RVH	1
Atrial fibrillation	0
Right bundle branch block	0
Flat ST	1
Sinus bradycardia	2
Arrhythmias	1

Relative risk of lipid abnormality due to chronic kidney disease

Triglyceride	Less than 150	More than 150
Cases	14(28%)	36(72%)
Controls	33(66%)	17(34%)

Relative risk value comes out 2.1176, which means that patients with chronic kidney disease have more chances of getting hypertriglyceridemia. P value is 0.0005 which means that relative risk is statistically significant.

Discussion

Chronic kidney disease leads to many deleterious effects on body. In India, diabetes and hypertension are two most common aetiologies for End Stage Renal Disease. There are very few treatment options for ESRD, renal transplantation being only cure of this disease.

In present study we found that mean age of chronic kidney disease patients was 53.54 ± 12.58 years. **Rajbhandari A et al** found that mean age was 54.17 ± 16.41 years⁹. Similarly **Ghimire M et al** found that mean age was 52.2 ± 15.6 years¹⁰.

We also found out that the mean triglyceride level among patients with chronic renal disease was 182.1 ± 63.12 . Almost similar results were seen by **Kumari KR et al**, they showed that mean 186.86 ± 49.94 ¹¹. **Saini M et al** showed that triglyceride level were raised, they found mean triglyceride level was 240.20 ± 35.40 ¹².

In current study we found mean cholesterol level among patients with chronic renal disease was 144.52 ± 44.163 . Almost similar results were seen by **Nagane NS et al**, they showed that mean 214.8 ± 29.03 [60]. **Chen S-C et al** found mean cholesterol level was 195.7 ± 53.7 mg/dl¹³.

Kestenbaum B et al proved that mean cholesterol level was 214.0 ± 39.0 mg/dl¹⁴. In current study we found mean HDL level was low 28.78 ± 11.994 in patient with chronic renal disease. **Morena M et al** found mean HDL value was 1.06 ± 0.3 mM (19.1 ± 5.4 mg/dl)¹⁵.

Lokesh S et al found mean HDL level was 31.82 ± 9.735 ¹⁶. We found that most common ECG abnormality is LVH seen in 18% of cases. Similarly,

Mulia, Eka P.B et al found LVH seen in 16.7 % of cases¹⁷ while **Bignotto LH et al** found LVH in 36.6% of cases¹⁸.

Hypertension was the most common abnormality among patient with chronic kidney disease in present study. Chronic hypertension (35.8%) was the most common comorbidities in subjects with CKD in study conducted by **Masina J et al**¹⁹. Hypertension was most common comorbidity in patients with chronic renal disease in a study conducted by **Chandrashekar A et al**²⁰.

Conclusion

In our present study, we found a difference of lipid profile between cases and controls. It is already known that dyslipidaemia is a risk factor for chronic kidney disease. And our study also shows a significant rise in triglyceride levels and fall in HDL levels among patients on maintenance haemodialysis. We also found that the correlation between eGFR and Triglyceride levels as well as correlation between eGFR and HDL levels was statistically

significant among patients on maintenance haemodialysis. As this is single centre study and sample size is small, so we need further studies to find correlation between dyslipidaemia and ECG changes in patient on maintenance haemodialysis.

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