ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 01 | January - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EVALUATION OF LIPID PROFILE IN CKD PATIENTS ON HAEMODIALYSIS WITH CONTROL POPULATION

Internal Medicine

Dr. Ayush Gupta* Post-Graduate, Department Of Internal Medicine, Acharya Shri Chander College Of Medical Sciences & Hospital, Jammu. *Corresponding Author

Dr. Vikram Sharma Professor, Internal Medicine, Acharya Shri Chander College Of Medical Sciences & Hospital, Jammu

ABSTRACT

Background: Chronic kidney disease (CKD) is a widespread medical condition that is projected to continue growing in prevalence, driven by the aging population and the increasing incidence of contributing factors such as diabetes and hypertension. The current study aimed to evaluate the lipid profile and its significance in CKD patients by comparing them with an age, sex, and body mass index-matched healthy control population. **Methods:** The present cross-sectional study was conducted in the General Medicine Department of Acharya Shri Chander College of Medical Sciences and Hospital, Jammu, over 06 months from January 2024 to June 2024. The study involved 60 participants, comprising 30 chronic kidney disease patients on hemodialysis and 30 healthy controls. Lipid profile parameters were evaluated and compared between the cholestasis group and the control group. **Results:** It was observed that Triglycerides were significantly higher in the chronic kidney diseases group compared to the healthy control group ($p<0.001$). There was a significant increase in triglyceride levels and a significant decrease in HDL-cholesterol levels in patients compared with the healthy controls ($p=0.001$). **Conclusion:** Significant lipid abnormalities were observed in patients with chronic kidney disease on Hemodialysis. Comprehensive management of dyslipidemia, along with other cardiovascular risk factors, is crucial in the care of patients with chronic kidney disease to improve their overall cardiovascular health and prognosis.

KEYWORDS

Chronic Kidney Disease, Cardiovascular Disease, Triglyceride.

INTRODUCTION:

Chronic Kidney Disease is a widespread medical condition that is projected to continue growing in prevalence, driven by the aging population and the increasing incidence of contributing factors such as diabetes and hypertension (1).

Chronic kidney disease is characterized by persistent structural or functional abnormalities of the kidneys, with significant implications for patient health (2). The assessment of kidney impairment is typically done by evaluating albuminuria and estimating the glomerular filtration rate based on serum creatinine values (2)

Patients with end-stage kidney disease often require dialysis treatment, with hemodialysis being the most common modality. However, this patient group faces significant challenges, including the development of malnutrition, which affects 28-54% of hemodialysis patients and is associated with increased morbidity, frailty, and mortality risk (3).

One important aspect of chronic kidney disease is the impact on lipid metabolism. Lipid abnormalities are commonly observed in chronic kidney disease patients, including dyslipidaemia, characterized by elevated triglycerides and low HDL cholesterol levels (4). Understanding the nature and significance of these lipid profile changes in chronic kidney disease patients is crucial, as they can contribute to the increased cardiovascular risk observed in this population (1,5).

The relationship between chronic kidney disease and cardiovascular disease is well-established (6,7,8). Patients with CKD have a significantly higher risk of developing cardiovascular complications compared to the general population (9,10). This is attributed to the presence of multiple classical and novel risk factors, including dyslipidemia, that predispose this group to premature cardiovascular mortality (10).

Cardiovascular disease in chronic kidney disease patients is a neglected subgroup, as the well-established diagnostic modalities and treatment strategies have not been studied in detail in this patient population (10). Further, cardiovascular disease in CKD patients is often disproportionately severe, with the incidence of cardiovascular mortality being much higher than the incidence of end-stage renal disease (9).

To investigate the lipid profile in chronic kidney disease patients on hemodialysis, the current study aimed to evaluate the lipid abnormalities and their significance in CKD patients by comparing them with an age, sex, and body mass index-matched healthy control population.

MATERIAL AND METHODS:

The present cross-sectional study was conducted in the General Medicine Department of Acharya Shri Chander College of Medical Sciences and Hospital, Jammu over 06 months from January 2024 to June 2024.

The study included 60 participants, comprising 30 CKD patients on hemodialysis and 30 age, sex, and BMI-matched healthy controls. The study population was selected as per the following inclusion and exclusion criteria:

Inclusion Criteria For Cases:
- Patients between the age group of 18 years and 80 years.
- Chronic kidney disease patients on maintenance hemodialysis

Inclusion Criteria For Controls:
- Normal healthy patients who were age and sex related to patients were included as controls

Exclusion Criteria:
- Patients with acute kidney injury and nephrotic syndrome.
- Patients with known dyslipidaemia, obesity, diabetes, or other endocrine disorders.
- Female pregnant women.

A written consent was obtained from both patients and controls. The demographic parameters such as Age, Gender, BMI, and clinical parameters of lipid profile, including total cholesterol, triglycerides, HDL-cholesterol, and LDL-cholesterol, were measured in all participants.

METHOD:

5 ml of venous blood samples were collected in plain tubes after an overnight fast from cases and controls. After collection, the samples were allowed to clot for half an hour following which the samples were centrifuged and serum was analysed. Serum total cholesterol (TC), triglycerides (TGs), HDL cholesterol (HDL-C), LDL cholesterol (LDL-C), Lp(a), urea, and creatinine, were measured colorimetrically using commercially available kits on a fully auto analyser of Clinical Biochemistry Laboratory. VLDL cholesterol concentration was calculated using Friedewald's Formula. The lipid profile parameters were evaluated and compared between the CKD and control groups.

Statistical Analysis:

Continuous variables were reported as mean ± standard deviation and

categorical variables as frequencies and percentages. Appropriate statistical tests were used to compare the lipid profile parameters between the CKD and control groups. Comparison between the two groups was done using Student's t-test, and a p-value<0.05 was considered statistically significant.

RESULTS

The study involved 60 participants, including 30 CKD patients on hemodialysis and 30 healthy controls matched by age, sex, and BMI.

Table 1: Baseline Parameters Of Study Participants

Variable	CKD Patients (n=30)	Healthy Controls (n=30)
Age Distribution	5.24 ± 12.3 years	44.7 ± 11.8 years
Sex (Male/Female)	18/12	20/10
BMI	23.5 ± 2.8 kg/m2	24.1 ± 2.5 kg/m2

Table 1 depicts the baseline parameters of study participants among cases and controls. It was observed that the mean age of study participants in CKD patients was 45.2 ± 12.3 years and 44.7 ± 11.8 years in healthy controls.

In both groups, male participants outnumbered the female participants. It was observed that there were 18 (60%) males and 12 (40%) females in the CKD group whereas there were 20(66.6%) males and 10 (33.3%) females in the control group.

Further, the mean BMI in CKD patients was 23.5 ± 2.8 kg/m2 whereas it was observed as 24.1 ± 2.5 kg/m2 in controls.

Table 2: Comparison Of Pattern Of Lipid Profile

Serum lipids (mg/dl)	CKD Patients (n=30)	Healthy Controls (n=30)	P value
Total Cholesterol	188.4 ± 22.6	182.1 ± 19.3	0.21
Triglycerides	196.2 ± 33.5	132.4 ± 25.8	<0.001
HDL-C	35.7 ± 6.2	46.8 ± 7.1	<0.001
LDL-C	116.3 ± 19.1	110.4 ± 17.6	0.17

Table 2 depicts the comparison of lipid profiles between the CKD and control groups. It was observed that Triglycerides were significantly higher in the CKD group compared to the control group (p<0.001). There was a significant increase in triglyceride levels and a significant decrease in HDL-cholesterol levels in CKD patients compared to the healthy control group. However, the changes in total cholesterol and LDL-cholesterol were not statistically significant between the two groups.

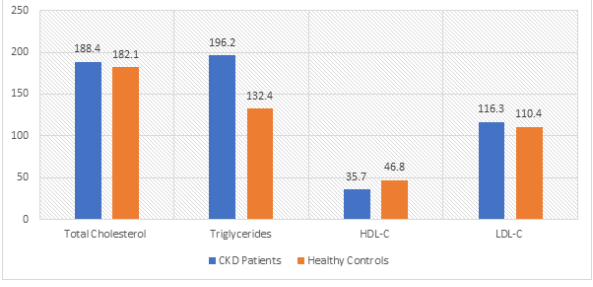

Fig. 1: Comparison Of Lipid Profile Among Two Groups

DISCUSSION

The present study's findings are consistent with the well-established lipid abnormalities observed in patients with chronic kidney disease as reported by similar studies conducted by Thomas et al., 2008 and Pascual et al., 2017.

It was observed that the mean age of study participants in CKD patients was 45.2 ± 12.3 years and 44.7 ± 11.8 years in healthy controls. There were 18 (60%) males and 12 (40%) females in the CKD group whereas there were 20 (66.6%) males and 10 (33.3%) females in the control group. The mean BMI of the CKD patients was 23.5 ± 2.8 kg/m2 and 24.1 ± 2.5 kg/m2 in the control group. The baseline demographic and clinical characteristics were well-matched between the two groups.

In previous similar studies, the age range of the study population was typically above 18 years (**Choudhury et al., 2009 and Omran et al., 2013**) (11,12). The male-female distribution and the BMI were also consistent with other similar studies.

It was observed that Triglycerides were significantly higher in CKD patients (196.2 ± 33.5 mg/dL) compared to healthy controls (132.4 ± 25.8 mg/dL). This is consistent with the existing literature which suggests that dyslipidaemia in CKD is typically characterized by elevated triglycerides and low HDL-C levels. (**Kaysen, 2006 and Pascual et al., 2017**) (13,14).

In our study, HDL-cholesterol levels were significantly lower in CKD patients compared to healthy controls. This finding is also in alignment with the established lipid abnormalities reported in CKD patients.

In contrast, the changes in total cholesterol and LDL-cholesterol were not statistically significant between the two groups. This lack of significant difference in LDL-C levels between CKD patients and controls has been previously reported in the literature (**Kaysen, 2006 and Omran et al., 2013**) (12,13).

The increased triglycerides and decreased HDL-C observed in the CKD group are commonly reported lipid abnormalities associated with chronic kidney disease (**Thomas et al., 2008 and Kaysen, 2006**) (1,13). The impairment in lipid metabolism in CKD is multifactorial, involving decreased lipoprotein lipase and hepatic triglyceride lipase activity, decreased clearance of triglyceride-rich lipoproteins, and increased production of very low-density lipoproteins (**Thomas et al., 2008**) (1).

The lack of significant differences in total cholesterol and LDL-C levels between the CKD and control groups is also consistent with the literature, which suggests that LDL-C is not strongly correlated with cardiovascular outcomes in CKD patients (**Kaysen, 2006**) (13).

Chronic kidney disease is often accompanied by a reduction in the activity of lipoprotein lipase and hepatic triglyceride lipase, which are responsible for the uptake and clearance of triglyceride-rich lipoproteins (**Thomas et al., 2008**)(1). This leads to the accumulation of these atherogenic lipoproteins in the circulation, contributing to the observed hypertriglyceridemia in CKD patients.

Furthermore, the decreased HDL-C levels in CKD patients can be explained by impaired reverse cholesterol transport, a process in which HDL particles facilitate the removal of cholesterol from peripheral tissues and deliver it to the liver for excretion (**Kumari & Srinivas, 2018**) The reduced activity of enzymes involved in HDL metabolism, such as lecithin-cholesterol acyltransferase and cholesteryl ester transfer protein, can contribute to the low HDL-C levels observed in CKD patients (**Kumari & Srinivas, 2018**) (15).

CONCLUSION

The present study findings highlight the presence of significant lipid abnormalities in chronic kidney disease patients on hemodialysis, characterized by elevated triglycerides and decreased HDL-C levels, compared to a healthy control population. These lipid profile changes are likely to contribute to the increased cardiovascular risk observed in this patient population. Comprehensive management of dyslipidemia, along with other cardiovascular risk factors, is crucial in the care of CKD patients to improve their overall cardiovascular health and prognosis.

Limitations And Future Directions

The current study was limited by its small sample size and cross-sectional design. Future studies with larger sample sizes, longitudinal follow-up, and evaluation of the impact of lipid-lowering therapies on cardiovascular outcomes in CKD patients are warranted to further elucidate the role of dyslipidemia in this patient population.

REFERENCES

1. Thomas R L, Kanso A A, Sedor J R. (2008). Chronic Kidney Disease and Its Complications [Review of Chronic Kidney Disease and Its Complications]. Primary Care Clinics in Office Practice, 2008;35(2): 329.
2. Schettini IVG, Faria D V, Nogueira L S, Otoni A, Silva A C S e, Rios D. R. A. Renin-angiotensin system molecules and chemokine (C-C motif) ligand 2 (CCL2) in chronic kidney disease patients. Brazilian Journal of Nephrology 2012;44(1):19.
3. Sahathevan S, Khor B, Ng H-M, Gafor A H A, Daud Z A M, Mafra D, Karupaiah T. Understanding Development of Malnutrition in Hemodialysis Patients: A Narrative Review [Review of Understanding Development of Malnutrition in Hemodialysis Patients: A Narrative Review]. Nutrients, 2020;12(10):3147.
4. Schiffrin E L, Lipman M L, Mann JFE. (2007). Chronic Kidney Disease: Effects on the Cardiovascular System. https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.106.678342
5. Krane V, Wanner C (n.d.). Dyslipidemia in Chronic Kidney Disease. Retrieved November 28, 2024, from https://onlinelibrary.wiley.com/doi/10.1002/9781444303391.ch32

6. Chirakarnjanakorn, S., Navaneethan, S. D., Francis, G. S., & Tang, W. H. W. (2017). Cardiovascular impact in patients undergoing maintenance hemodialysis: Clinical management considerations [Review of Cardiovascular impact in patients undergoing maintenance hemodialysis: Clinical management considerations]. International Journal of Cardiology 2017; 232: 12.
7. Fujii, H., Kono, K., & Nishi, S. (2019). Characteristics of coronary artery disease in chronic kidney disease [Review of Characteristics of coronary artery disease in chronic kidney disease]. Clinical and Experimental Nephrology, 23(6), 725.
8. Jabbar A, Qureshi R, Dhrolia M, Nasir K, Ahmad, A. (2021). Variety of Cardiac Events in Hospitalized Chronic Kidney Disease Patients. Cureus Inc. https://doi.org/10.7759 /cureus.18801
9. Duni A, Liakopoulos V, Rapsomanikis KP, Dounousi E. (2017). Chronic Kidney Disease and Disproportionally Increased Cardiovascular Damage: Does Oxidative Stress Explain the Burden? [Review of Chronic Kidney Disease and Disproportionally Increased Cardiovascular Damage: Does Oxidative Stress Explain the Burden?]. Oxidative Medicine and Cellular Longevity, 2017(1).
10. Subbiah A K, Chhabra Y, Mahajan S. (2016). Cardiovascular disease in patients with chronic kidney disease: a neglected subgroup. Heart Asia 2016;8(2):56.
11. Choudhury D, Tuncel M, Levi M. (2009). Disorders of Lipid Metabolism and Chronic Kidney Disease in the Elderly. In D. Choudhury, M. Tuncel, & M. Levi, Seminars in Nephrology 2009;29(6):610.
12. Omran J, Al.Dadah A, Dellsperger K C (2013). Dyslipidemia in Patients with Chronic and End-Stage Kidney Disease [Review of Dyslipidemia in Patients with Chronic and End-Stage Kidney Disease]. Cardiorenal Medicine 2013;3(3): 165.
13. Kaysen G A. (2006). Dyslipidemia in chronic kidney disease: Causes and consequences. In G. A. Kaysen, Kidney International (Vol. 70). Elsevier BV.
14. Pascual V, Serrano A, Pedro.Botet J, Ascaso J F, Barrios V, Millán J, Pintó X, Cases A. (2017). Chronic kidney disease and dyslipidemia. Clínica e Investigación en Arteriosclerosis (English Edition) 2017;29(1):22.
15. Kumari K R, Srinivas B. (2018). Study of Lipid Profile in Patients with Chronic Kidney Disease on Conservative Management and Hemodialysis.