Section: General Medicine

Original Research Article

LIPID PROFILE AND ITS CORRELATION WITH EGFR IN CHRONIC KIDNEY DISEASE PATIENTS

Rakib Saikh[1], Tarik Aziz Biswas[2], Kaushik Ishore[3], Ramtanu Bandyopadhyay[4]

[1]*Senior Resident, Department of General Medicine, R. G. Kar Medical College & Hospital, Kolkata, India.*
[2]*Senior Resident, Department of General Medicine, Murshidabad Medical College & Hospital, Murshidabad, India.*
[3]*Associate Professor, Department of Community Medicine, MJN Medical College and Hospital, Cooch Behar, India.*
[4]*Professor and H.O.D, Department of General Medicine, R. G. Kar Medical College & Hospital, Kolkata, India.*

Received *: 10/08/2025*
Received in revised form *: 24/09/2025*
Accepted *: 13/10/2025*

Corresponding Author:
Dr. Rakib Saikh,
Senior Resident, Department of General Medicine, R. G. Kar Medical College & Hospital, Kolkata, India.
Email: rakibsaikh51@gmail.com

DOI: 10.70034/ijmedph.2025.4.192

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 1080-1083

ABSTRACT

Background: Chronic kidney disease (CKD) is a major global health problem associated with high morbidity and mortality, particularly due to cardiovascular complications. Dyslipidemia is highly prevalent among CKD patients and contributes both to cardiovascular disease (CVD) risk and the progression of renal dysfunction. **Objective:** To study the clinical profile and estimated glomerular filtration rate (eGFR) in CKD patients, assess lipid profile abnormalities, and analyze their correlation with eGFR.

Materials and Methods: A hospital-based, cross-sectional observational study was conducted in the Department of General Medicine, R.G. Kar Medical College & Hospital, Kolkata, over one year (June 2021 – May 2022). A total of 100 consecutive CKD patients (≥18 years, eGFR <60 ml/min/1.73 m², with >3 months evidence of CKD) were enrolled. Patients with acute renal failure, nephrotic syndrome, recent major cardiovascular events, pregnancy, or on lipid-altering medications were excluded. Clinical details and laboratory investigations including complete hemogram, kidney function tests, lipid profile, electrolytes, urine ACR, and imaging were recorded. Data were analyzed using SPSS v27.0.

Results: The mean age of patients was 50.3 ± 7.9 years, with male predominance (male: female ratio = 1.08:1). Most patients (44%) were aged 41–50 years. The mean serum cholesterol, triglyceride (TG), HDL, and LDL were 203.83 ± 34.86 mg/dL, 210.31 ± 75.26 mg/dL, 35.69 ± 7.08 mg/dL, and 126.15 ± 31.92 mg/dL respectively. The mean serum creatinine was 3.88 ± 1.58 mg/dL, and mean eGFR was 19.39 ± 11.78 ml/min/1.73 m². Dyslipidemia worsened with declining renal function. Stage 5 CKD patients had significantly higher total cholesterol, LDL, and TG levels, and significantly lower HDL levels compared to earlier stages ($p<0.0001$). Age was significantly associated with CKD stage ($p=0.0294$).

Conclusion: Dyslipidemia is highly prevalent among CKD patients and correlates significantly with worsening renal function. Lipid abnormalities, particularly elevated cholesterol, triglycerides, LDL, and reduced HDL, may contribute to CKD progression and increased cardiovascular risk. Early detection and management of dyslipidemia in CKD patients are crucial to improve outcomes.

Keywords: Chronic Kidney Disease, Dyslipidemia, Lipid Profile, eGFR, Cardiovascular Disease.

INTRODUCTION

Chronic kidney disease (CKD) is a progressive disorder characterized by a decline in glomerular filtration rate (GFR) and structural kidney abnormalities. It has emerged as a global public health challenge with a prevalence of 8–16% worldwide and over 10% in the adult population of the United States.[1,2] In India, estimates suggest up to 785 cases per million population, though true figures

remain uncertain due to the lack of a national registry.[3]

CKD patients experience significantly increased cardiovascular morbidity and mortality, with cardiovascular disease (CVD) being the leading cause of death.[4] Dyslipidemia is a well-recognized complication in CKD and is thought to not only contribute to CVD but also accelerate kidney damage.[5,6]

The dyslipidemic profile in CKD is characterized by elevated triglycerides, reduced high-density lipoprotein cholesterol (HDL-C), increased small dense low-density lipoprotein cholesterol (LDL-C), and elevated lipoprotein(a).[7] In advanced CKD, both LDL and HDL particles undergo oxidative modification, further exacerbating vascular and renal injury.[8] Experimental studies suggest that hyperlipidemia worsens renal injury, whereas lipid-lowering therapy can ameliorate it.[9,10]

This study was conducted to evaluate lipid profile abnormalities in CKD patients and to analyze their correlation with eGFR, with the aim of understanding the role of dyslipidemia in disease progression.

Aims and Objectives

1. To study the clinical profile and eGFR of chronic kidney disease patients.
2. To study the lipid profile abnormalities in chronic kidney disease patients.
3. To study the correlation of lipid profile abnormalities with eGFR.

MATERIALS AND METHODS

This hospital-based, cross-sectional observational study was conducted in the Department of General Medicine, R.G. Kar Medical College & Hospital, Kolkata, from June 2021 to May 2022. A total of 100 consecutive CKD patients were enrolled. Inclusion criteria were: age >18 years, both sexes, eGFR <60 ml/min/1.73 m², and radiological/biochemical evidence of CKD >3 months. Patients with acute renal failure, nephrotic syndrome, patients on haemo-dialysis, pregnancy, recent acute cardiovascular events (<3 months), or those on lipid-altering drugs (statins, beta-blockers, oral contraceptives) were excluded.

All patients underwent hematological, biochemical, and imaging investigations, including complete hemogram, kidney and liver function tests, serum electrolytes, calcium, phosphate, uric acid, urinary albumin-creatinine ratio (ACR), urine routine with microscopy, chest X-ray, and ultrasonography of the KUB. A fasting lipid profile (TC, TG, LDL, HDL) was performed in all cases. CKD staging was done as per the KDIGO 2012 classification, and eGFR was calculated using the CKD-EPI equation.

Data were analyzed using SPSS v27.0 and GraphPad Prism v5. Continuous variables were expressed as mean ± SD, and categorical variables as frequency and percentage. Statistical comparisons were made using the independent t-test, one-way ANOVA, Chi-square test, and Fisher's exact test. A p-value ≤0.05 was considered significant.

RESULTS

A total of 100 patients with chronic kidney disease (CKD) were included in the study. The results are presented below in terms of demographic profile, biochemical parameters, and correlation of lipid profile with eGFR and CKD stages.

1. Demographic Profile

The mean age of the study population was **50.3 ± 7.9 years** (range 30–72 years). The majority of patients (44%) were in the 41–50 years age group. There was a slight male predominance, with a male-to-female ratio of 1.08:1.

Table 1: Age and Gender Distribution of Study Population (n=100)

Age Group (years)	Male n (%)	Female n (%)	Total n (%)
30–40	10 (19.2%)	8 (16.7%)	18 (18.0%)
41–50	23 (44.2%)	21 (43.8%)	44 (44.0%)
51–60	14 (26.9%)	13 (27.1%)	27 (27.0%)
>60	5 (9.6%)	6 (12.5%)	11 (11.0%)
Total	**52 (100%)**	**48 (100%)**	**100 (100%)**

2. Biochemical Parameters

The mean serum creatinine was **3.88 ± 1.58 mg/dL** and mean eGFR was **19.39 ± 11.78 ml/min/1.73 m²**. The average lipid parameters are presented in Table 2. Dyslipidemia was common, with elevated cholesterol, triglycerides, LDL, and reduced HDL.

Table 2: Biochemical Profile of Study Population (n=100)

Parameter	Mean ± SD	Reference Range
Serum Creatinine (mg/dL)	3.88 ± 1.58	0.7–1.3
eGFR (ml/min/1.73 m²)	19.39 ± 11.78	>90 (normal)
Total Cholesterol (mg/dL)	203.83 ± 34.86	<200
Triglycerides (mg/dL)	210.31 ± 75.26	<150
LDL (mg/dL)	126.15 ± 31.92	<100
HDL (mg/dL)	35.69 ± 7.08	>40 (men), >50 (women)

3. Lipid Profile by CKD Stage

Lipid abnormalities worsened progressively with CKD stage. Patients in stage 5 had significantly higher total cholesterol, triglycerides, LDL, and lower HDL compared to earlier stages.

Table 3: Lipid Profile in Relation to CKD Stage (n=100)

CKD Stage (KDIGO)	n	Total Cholesterol (mg/dL)	Triglycerides (mg/dL)	LDL (mg/dL)	HDL (mg/dL)
Stage 3a (eGFR 45–59)	10	182.1 ± 22.6	156.3 ± 34.2	104.8 ± 18.4	42.5 ± 6.3
Stage 3b (eGFR 30–44)	16	192.4 ± 25.9	173.2 ± 41.6	112.7 ± 22.1	39.6 ± 5.7
Stage 4 (eGFR 15–29)	22	201.6 ± 30.3	195.7 ± 58.3	121.9 ± 26.4	36.8 ± 6.1
Stage 5 (eGFR <15)	52	219.4 ± 37.5	243.9 ± 78.2	138.6 ± 34.8	32.2 ± 5.4
p-value (ANOVA)		**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**

One-way ANOVA test used; significant differences noted across CKD stages

4. Correlation of Lipid Profile with eGFR

Pearson's correlation analysis showed a negative correlation of eGFR with total cholesterol, triglycerides, and LDL, and a positive correlation with HDL. These findings indicate worsening dyslipidemia with decreasing renal function.

Table 4: Correlation of eGFR with Lipid Parameters

Parameter	Correlation Coefficient (r)	p-value	Interpretation
Total Cholesterol	-0.456	<0.001	Significant negative correlation
Triglycerides	-0.398	<0.001	Significant negative correlation
LDL	-0.412	<0.001	Significant negative correlation
HDL	+0.362	<0.001	Significant positive correlation

5. Serum Creatinine and eGFR by CKD Stage

As expected, serum creatinine progressively increased and eGFR decreased with advancing CKD stages.

Table 5: Renal Function Parameters Across CKD Stages

CKD Stage	n	Serum Creatinine (mg/dL)	eGFR (ml/min/1.73 m²)
Stage 3a	10	1.8 ± 0.5	52.3 ± 4.1
Stage 3b	16	2.6 ± 0.6	36.4 ± 3.9
Stage 4	22	3.7 ± 0.8	22.7 ± 4.2
Stage 5	52	5.3 ± 1.2	10.9 ± 3.6
p-value		**<0.0001**	**<0.0001**

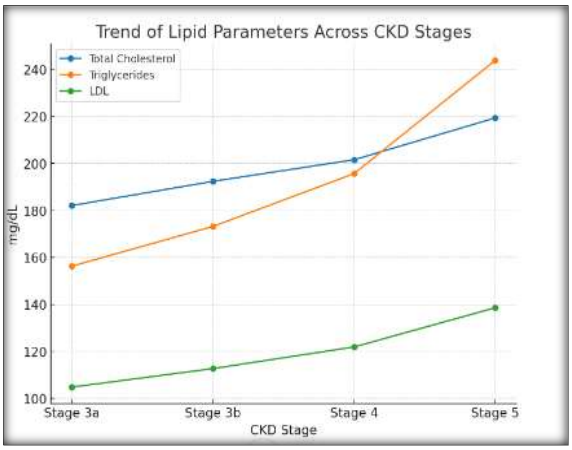

Figure 1

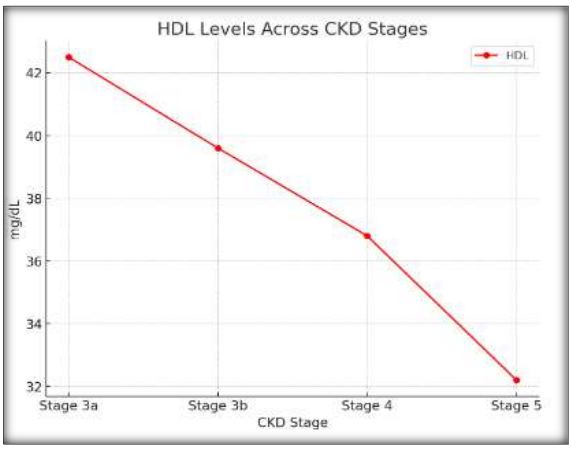

Figure 2

DISCUSSION

This study demonstrated that dyslipidemia is prevalent among CKD patients and worsens with declining renal function. Patients in stage 5 CKD had significantly higher total cholesterol, triglycerides, LDL, and significantly lower HDL compared to earlier stages. These findings are consistent with earlier studies by Lahariya et al. (2018)11, Raju et al. (2013)12, and Choudhary et al. (2019)13, which showed that CKD is associated with an atherogenic lipid profile.

The dyslipidemia observed may contribute both to cardiovascular risk and renal disease progression through mechanisms involving mesangial proliferation, podocyte injury, oxidized LDL-induced apoptosis, and enhanced inflammatory cytokine production.

Our findings support the hypothesis that lipid abnormalities are not just bystanders but active contributors to CKD progression. Early screening and management of dyslipidemia in CKD patients may therefore reduce cardiovascular risk and slow renal deterioration.

CONCLUSION

In this study, most CKD patients were middle-aged, with a slight male predominance. Dyslipidemia was highly prevalent, characterized by elevated total cholesterol, triglycerides, and LDL, along with reduced HDL levels. The severity of lipid

abnormalities worsened progressively with advancing CKD stage and showed a significant correlation with declining eGFR. These findings highlight the importance of routine lipid monitoring in CKD patients and early therapeutic intervention to improve long-term renal and cardiovascular outcomes.

REFERENCES

1. Mills KT, Xu Y, Zhang W, Bundy JD, Chen CS, Kelly TN, et al. A systematic analysis of worldwide population-based data on the global burden of chronic kidney disease in 2010. Kidney Int. 2015;88(5):950–7.
2. Coresh J, Selvin E, Stevens LA, Manzi J, Kusek JW, Eggers P, et al. Prevalence of chronic kidney disease in the United States. JAMA. 2007;298(17):2038–47.
3. Rajapurkar MM, John GT, Kirpalani AL, Abraham G, Agarwal SK, Almeida AF, et al. What do we know about chronic kidney disease in India: first report of the Indian CKD registry. BMC Nephrol. 2012; 13:10.
4. Go AS, Chertow GM, Fan D, McCulloch CE, Hsu C-Y. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. N Engl J Med. 2004;351(13):1296–305.
5. Vaziri ND. Dyslipidemia of chronic renal failure: the nature, mechanisms, and potential consequences. Am J Physiol Renal Physiol. 2006;290(2):F262–72.
6. Kwan BC-H, Kronenberg F, Beddhu S, Cheung AK. Lipoprotein metabolism and lipid management in chronic kidney disease. J Am Soc Nephrol. 2007;18(4):1246–61.
7. Attman PO, Samuelsson O, Alaupovic P. Lipoprotein metabolism and renal failure. Am J Kidney Dis. 1993;21(6):573–92.
8. Shoji T, Nishizawa Y. Plasma lipoproteins and progressive renal failure. Kidney Int Suppl. 1997;62:S17–9.
9. Keane WF, O'Donnell MP, Kasiske BL. Lipids and progressive glomerulosclerosis. Am J Nephrol. 1988;8(4):261–71.
10. Wanner C, Tonelli M; Kidney Disease: Improving Global Outcomes Lipid Guideline Development Work Group Members. KDIGO Clinical Practice Guideline for Lipid Management in Chronic Kidney Disease. Kidney Int Suppl. 2013;3(3):259–305.
11. Lahariya D, Parmar AS. A Study of Lipid Profile and Staging in Non-Diabetic Chronic Kidney. JMSCR. 2018;6(4):990-5.
12. Raju DS, Lalitha DL, Kiranmayi P. A study of lipid profile and lipid peroxidation in chronic kidney disease with special reference to hemodialysis. J Clinic Res Bioeth. 2013;4(1):1000143.
13. Choudhary N. A study of lipid profile in chronic kidney disease in pre-dialysis patients. Int J Med Res Rev. 2019;7(3):150-6.