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Lipid Profile and Echocardiographic Findings in Patients with Chronic Kidney Disease in Manipur: A Cross-sectional Study

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Abstract:

Background*:* Chronic kidney disease (CKD) is an important cause of morbidity and mortality worldwide. Progressive renal failure is associated with characteristic alterations in lipoprotein metabolism and dyslipidemia. Heart disease is also a major cause of mortality and morbidity among patients with renal failure.

Materials and Methods*:* A hospital based cross sectional study was conducted in Imphal among 572 CKD patients admitted during January 2018 to December 2022. The lipid profile was measured and echocardiography was performed for all the participants. Data was analysed using SPSS version 21 software and reported as frequencies and percentages.

Results*:* 40% of the patients had triglycerides ≥ 200 mg/dl, while LDL ≥160 mg/dl and cholesterol ≥240 mg/dl was found in 10% of the patients. HDL was <40 mg/dl in 54% of the patients. Left ventricular hypertrophy (LVH) was found in 96% of the patients; LVD, PE and LVDD were found in 38%, 34% and 32% of the patients respectively.

Conclusion*:* Dyslipidemia and echocardiographic changes are common in CKD patients with four out of every 10 CKD patients having high levels of triglycerides and majority having left ventricular hypertrophy.

Key Word: CKD, lipid profile, echocardiography

I. Introduction

Chronic kidney disease (CKD) is an important cause of morbidity and mortality worldwide, affecting >10% of the general population globally, amounting to >800 million individuals.[1] CKD denotes a progressive and irreversible loss of nephrons causing permanently impaired renal function and gradually leading to end stage renal disease.[2] Progressive renal failure is associated with characteristic alterations in lipoprotein metabolism and dyslipidemia. Patients with end-stage renal disease (ESRD) suffer from a secondary form of complex dyslipidemia consisting of both quantitative and qualitative abnormalities in serum lipoproteins resulting from alterations in lipoprotein metabolism and composition. Dyslipidemia contributes to glomerular and interstitial injury of renal parenchyma.[3] Accumulation of lipids in mesangial cells accelerate atherosclerosis, as in vascular smooth muscle cells.[4,5] LDL cholesterol have been found to adhere to endothelial cells and contribute to inflammatory glomerular disease.[6]

The heart and the kidney are linked by hemodynamic and regulatory functions.[7] Heart disease is a major cause of mortality and morbidity among patients with renal failure, accounting for nearly 50% of all deaths among advanced CKD as well as end-stage kidney disease patients.[8] Left ventricular disease occurs frequently in end stage renal disease (ESRD) manifesting as systolic dysfunction, left ventricular hypertrophy (LVH) and left ventricular dilatation. LVH is evident in 40% of patients with moderate renal insufficiency and in 75% of those commencing dialysis.[9]

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There is limited literature on the lipid profile and echocardiography findings among the CKD patients in Manipur. Therefore, the present study was conducted to study the lipid profile and echocardiography changes in patients with chronic kidney disease.

II. Material And Methods

A cross sectional study was conducted in a tertiary teaching hospital in Imphal, Manipur. All the patients above 18 years of age who were diagnosed with CKD and admitted in the Medicine wards of the hospital during January 2018 to December 2022 were included as the study participants. CKD was diagnosed when i) there was kidney damage ≥ three months as evident by structural or functional abnormalities with reduced glomerular filtration rate (GFR) and manifested by kidney damage markers in blood or urine or imaging tests or ii) estimated GFR < 60ml/min/1.73m^2 for ≥ three months. Patients with preexisting primary cardiac disease, arteriovenous fistula, chronic liver disease and had active or history of recent infection during last three weeks were excluded. A detailed history was taken and complete physical examination carried out for all the patients. Lipid profile of the patients were done by kit-method using TG-Liquicolor kit, Cholesterol- Liquicolor kit and HDL- Liquicolor kit. The patients also underwent 2-D directed M-mode echocardiography performed in left decubitus position using 2.5Hz/3.5Hz transducer. Data on sociodemographic variables, clinical and investigation findings were recorded in a predesigned proforma.

Data was analysed using SPSS version 21 software. Results were expressed as frequencies and percentages. Pearson's correlation coefficient was calculated for correlation. A p value < 0.05 was considered significant.

Ethical approval was obtained from the Research Ethics Board of the institute and written informed consent was obtained from all study participants before recruitment into the study.

III. Result

A total of 572 CKD patients were included in the study. Table 1 shows the baseline characteristics of the patients. Majority of the patients were males (58%), and diabetic nephropathy was the most common etiology for CKD (39.3%) followed by obstruction (19.23%) (Table 1).

The lipid profile of patients is illustrated in Table 2. 40% of the patients had triglycerides ≥ 200 mg/dl, while LDL ≥160 mg/dl and cholesterol ≥240 mg/dl was found in 10% of the patients. HDL was <40 mg/dl in 54% of the patients. Left ventricular hypertrophy (LVH) was found in 96% of the patients with 84% of the patients having concentric LVH; LVD, PE and LVDD were found in 38%, 34% and 32% of the patients respectively.

There was no significant correlation of lipid profile with EF or LVMI (Table 4).

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Table 1. Baseline characteristics of the patients (n=572)

Characteristic	Frequency	Percentage
Sex		
Male	332	58
Female	240	42
Duration of illness		
≤1 year	69	12.1
2-3 years	206	36
4-5 years	194	33.9
>5 years	103	18
Etiology		
Diabetic nephropathy	225	39.3
Obstructive nephropathy	110	19.23
Chronic glomerulonephritis	100	17.4
Hypertensive nephropathy	70	12.28
Lupus nephritis	52	9.00
Cystic disease	15	2.6
BMI		
< 18.5	57	10
18.5 – 24.9	469	82
≥25	46	8

Table 2. Lipid profile of the patients (n=572)

Parameter	Frequency	Percentage
Triglycerides		
<150 mg/dl	343	60
150-199 mg/dl	0	0
≥ 200 mg/dl	229	40
HDL		
<40 mg/dl	309	54
40-60 mg/dl	240	42
>60 mg/dl	23	4
LDL		
<130 mg/dl	389	68
130-159 mg/dl	126	22
≥160 mg/dl	57	10
Cholesterol		
<200 mg/dl	469	82
200-239 mg/dl	46	8
≥240 mg/dl	57	10

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Table 3. Echocardiography findings in the patients (n=572)

Parameter	Frequency	Percentage
LVH	549	96
Eccentric LVH Concentric LVH	68 480	12 84
LVD	217	38
RWMA	34	6
PE	195	34
MAC	11	2
LVSD	92	16
LVDD	183	32
Irregular Rhythm	34	6
RA Dilatation	34	6
Thick Pericardium	11	2
AR	114	20
MR	103	18
TR	80	14
AS	11	2

Abbreviations: LVH- left ventricular hypertrophy, LVD- left ventricular dysfunction, RWMA- right ventricular wall motion abnormalities, PE- pericardial effusion, MAC - mitral annular calcification, LVD-Left ventricular dysfunction, LVSD-Left ventricular systolic dysfunction, LVDD-Left ventricular diastolic dysfunction, AR - aortic regurgitation, TR- tricuspid regurgitation, MR- mitral valve regurgitation, AS- Aortic stenosi

Table 4. Correlation of EF and LVMI with lipid profile (n=572)

Echo cardio graphic finding	Lipid parameters	Pearson's correlation coefficient	p value
EF	Cholesterol	-0.001	0.993
LVMI	Cholesterol	-0.072	0.619
EF	TG	-0.046	0.753
LVMI	TG	-0.173	0.229
EF	LDL	-0.045	0.758
LVMI	LDL	+0.022	0.877
EF	HDL	+0.204	0.156
LVMI	HDL	-0.122	0.40

IV. Discussion

In this study, diabetic nephropathy was the commonest etiology accounting for 39% of the patients, which is similar to the study by Mahalakshmi et al,[10] where 40% of the CKD patients attending a tertiary hospital in Visakhapatnam, India had diabetic nephropathy as the etiology. Chaudhari et al,[11] Jha et al[12] and Parsi et al[13] also reported diabetic nephropathy as the commonest etiology of CKD.

In our study, half of the patients had HDL level <40 mg/dl which is consistent with the findings of Verma M et al,[14] where the mean HDL level was found to be 44.99±15.35 mg/dl. Ahmad R et al[15] reported a mean triglyceride level of 170.23±101.9 among CKD patients attending a

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hospital in Peshawar. Our study also found that triglyceride level was high (>200mg/dl) in 40% of the patients. In addition, high levels of cholesterol and LDL were reported in 10% of the patients.

Five hundred and forty-nine patients (96%) of the CKD patients were found to have either concentric or eccentric left ventricular hypertrophy. This is similar to the finding in a study in Nigeria where 95.5% of the CKD patients were also found to have LVH.[16] LVH was also found to be the commonest abnormality on echocardiography in CKD patients in the study by Islam T et al,[17] though the proportion was lesser (35%). The difference in the proportion could be due to the different sample sizes. Other common echocardiographic abnormalities found were LVD, PE and LVDD, which were found in more than 30% of the patients.

The large sample size is a strength of our study. As this was a single hospital based study, for better generalizability, further multicentric studies and community based studies could be conducted.

V. Conclusion

Four out of every 10 CKD patients had high level of triglycerides and half of the CKD patients had low level of HDL. Echocardiographic abnormalities are also quite common with left ventricular hypertrophy detected in majority of the CKD patients. Thus, lipid profile and echocardiographic evaluation should be considered routinely for all CKD patients.

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Competing interest:

There is no Competing interest

Authors contribution:

All authors in our study contributed to the data collection of the patients

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