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Assessment Of Lipid Profile And 2D Echo In ESRD Patients

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Abstract

Introduction: End-stage renal disease is becoming more common around the world. Number of patients with early CKD - the pool from which future end-stage renal disease patients will emerge - exceeds the current number of patients with end-stage renal disease, putting the population at risk for moderate to severe CKD at risk. The aim of the present study is to evaluate 2D echo and lipid profile in end stage renal disease patients.

Methods: cross sectional observational study conducted at a Tertiary Health Care Centre. Patients diagnosed as chronic kidney disease were selected with help of special case proforma designed for the study and all the patients from medical intensive care unit, wards and OPD were included. They were evaluated by performing the 2D ECHO, LIPID profile and other biochemical and Hematological profile. The duration of the study was 6 months.

Results: Total 43 patients diagnosed with chronic kidney disease were included, with mean age of 52.85 ± 13.76 year. The association of categories of Carotid Artery Doppler i.e. normal and abnormal, were compared with 2D echo findings, including left ventricular diastolic dysfunction (LVDD) grades, left ventricular systolic dysfunction (LVSD) severity, Pulmonary arterial hypertension (PAH) and severity of LVH. 43 patients underwent 2D echo and we found no association between these 2D echo parameters and Carotid Artery Doppler.

Conclusion: Echocardiography is cost effective and a non-invasive diagnostic test for CKD patients and is important for early preventive measures and in checking prognosis of the disease.

Keywords: Chronic Kidney Disease,Echocardiography, Glomerular Filtration rate.

Introduction

Cardiovascular disease is a leading cause of morbidity and mortality in patients at every stage of chronic kidney disease. 30% - 45% of patients reaching stage 5 chronic kidney disease already have developed cardiovascular complications. According to NKF guidelines, CKD defined as either[1] Kidney damage for > 3 months as confirmed by kidney biopsy or markers of kidney damage with or without a decrease in glomerular filtration rate (GFR) or[2] GFR < 60 mL/min/1.73 m2 for > 3 months with or without kidney damage. Kidney damage is ascertained by either kidney biopsy or markers of kidney damage such as proteinuria, urinary sediment or abnormalities on imaging studies.

End-stage renal disease is becoming more common around the world. The current number of patients with early CKD - the pool from which future end-stage renal disease patients will emerge - exceeds the current number of patients with end-stage renal disease, putting the population at risk for moderate to severe CKD at risk. Due to a lack of accurate data,

the burden of CKD in India cannot be accurately assessed.

Chronic kidney disease (CKD), which is defined by a continuous reduction in the glomerular filtration rate and/or renal damage (i.e., albuminuria) has been recognized as a global health problem of epidemic proportions.[3,4] CKD is closely associated with cardiovascular disease (CVD); approximately 30% to 40% of patients with symptomatic stroke have CKD.[15] Furthermore, a continuous decline in the estimated glomerular filtration rate (eGFR) and the existence of proteinuria[6,7] have been reported as independent risk factors for CVD. A lower eGFR on admission for stroke is an independent risk factor for mortality and new CVD.[8]

Cardiovascular disease (CVD) is the leading cause of death in chronic kidney disease patients (CKD). Because atherosclerosis is often asymptomatic unless it is severe, a direct examination of the vessel wall is required to detect affected individuals in the early stages. In CKD patients, atherosclerosis is the most common cause of cardiovascular morbidity.[9-11]

Furthermore, the presence of proteinuria[6,11] and a continuous decline in the estimated glomerular filtration rate (eGFR) have been reported as independent risk factors for CVD. On admission for a stroke, a lower eGFR is an independent risk factor for mortality and new CVD.[12] Carotid atherosclerosis was significantly advanced in patients with CKD, according to a previous report on acute cerebral infarction.[13] According to other studies, CKD without hypertension has no link to carotid atherosclerosis.[14]

The aim of the present study is to evaluate 2D echo and lipid profile in end stage renal disease patients.

Materials And Methods

It was a cross sectional observational study conducted at Tertiary Health Care Centre, Pune. Patients diagnosed as chronic kidney disease were selected with help of special case record format designed for the study and all the patients from medical intensive care unit, wards and OPD were included. They were evaluated by performing the 2D ECHO, LIPID profile and other biochemical and Hematological profile. The duration of the study was 6 months.

Inclusion Criteria:

1. Patients between the age group of 18 and 85 years with established CKD.
2. Patients who were on conservative or dialysis treatment for CKD.
3. Established renal failure was ensured by radiological evidence or biochemical evidence for >3 months by standard guidelines.

Exclusion Criteria:

1. Patients with acute renal failure and nephrotic syndrome.
2. Patients who are pregnant.

Methodology

After inclusion of patients in the study, demographic records (information comprised of sex, age, and address), alcohol use, smoking and history of all patients were collected. Written informed consent in English and local language was taken from the cases after explaining the nature of the evaluation to them. Each person was subjected to a thorough history and physical examination. A thorough history of ischemic stroke, presence of risk factors like diabetes mellitus, hypertension, smoking, alcohol, dyslipidemia, atrial fibrillation, metabolic syndromes if any was ruled out carefully and correlated. A complete clinical examination was done with special reference to signs of CKD like pallor, puffiness of face etc. Blood pressure was measured with standard mercury sphygmomanometer and cuff, after the subject had rested in supine position for 15 minutes. Two measurements were taken with 10 minutes break and average of the two measurements was taken as the final value of blood pressure. Hypertension is defined as blood pressure >140/90 mm Hg or if the patient is already on antihypertensive drug.

All patients were investigated with complete hemogram, urine analysis, blood urea levels, serum creatinine levels, lipid profile and 2D ECHO. All the biochemical parameters were measured by standard laboratory technique. The blood samples were drawn after 10-12 hours of overnight fasting. Glomerular filtration rate. (GFR) was calculated by modification of diet in renal disease formula (MDRD) formula. Complete blood count is done by counter report.

Statistical Analysis

Statistical analysis was done by using descriptive and inferential statistics using the Chi square test, t-test

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for difference between two means, Pearson's Correlation coefficient and Multiple Regression Analysis and software used in the analysis are the SPSS 26.0 version. $p<0.05$ is considered as level of significance. Univariate correlation analysis was used to confirm the significance of variables with CIMT.

Results

Table 1: Demographic details

Age	**Frequency**	**Percent**
<40	8	18.60
40-60	17	39.53
>60	18	41.87
Gender		
Females	15	34.88
Males	28	65.12
Status of hemodialysis		
Yes	40	93.02
No	3	6.98
Co-morbidities		
Diabetes mellitus	18	41.86
Hypertension	40	93.02
Tuberculosis	1	2.32
IHD	5	11.62
Medication status (SAPT +STATIN)		
Yes	16	37.20
No	27	62.80

Total 43 patients diagnosed with chronic kidney disease were included, with mean age of 52.85 ± 13.76 years, ranging between 19 and 76 years. Most (31 (41.87%)) of the patients were in the age group of >60 years, followed by 40-60 years (29 (39.53%)) and <40 years (14 (18.60%)). Among total 43 CKD patients 15 (34.88%) were females and 28 (65.12%) were males. Out of 43 study population with CKD, majority 40 (93.02%)) of patients were undergoing hemodialysis, while there were only 3 (6.98%) of patients who were not on hemodialysis. Among 43 CKD patients, 40 (93.02%) of patients were suffered hypertension, followed by diabetes mellitus which was present in 18 (41.86%) of patients, IHD in 5 (11.62%) and tuberculosis in 1 (2.32%) of patients. There were total 16/43 patients on medication mostly taking statins, while 27 (62.80%) patients were on no medication.

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Table 2: 2D echo findings (N=43)

		Frequency	Percent
EF %	30-35	1	2.3
	35-40	4	9.3
	40-45	1	2.3
	45-50	2	4.65
	50-55	6	13.95
	55-60	29	67.4
PAH	Mild	6	13.95
	Moderate	3	6.97
	Severe	1	2.3
RWMA	YES	11	25.58
LVH CONCENTRIC	Mild	37	86.04
	Severe	1	2.3
LVDD	Grade 1	30	69.76
	Grade 2	5	11.62
LVSD	Mild	1	2.3
	Moderate	7	16.27
Degenerative valve changes	Yes	12	27.90

We reported 2D echo findings in the study population. The association of categories of Carotid Artery Doppler i.e. normal and abnormal, were compared with 2D echo findings, including left ventricular diastolic dysfunction (LVDD) grades, left ventricular systolic dysfunction (LVSD) severity, Pulmonary arterial hypertension (PAH) and severity of LVH.

Table 3: Association of 2D echo findings with Carotid Artery Doppler (n=43)

		Carotid Artery Doppler		**Total**	**p value**
		Normal	**Abnormal**		
LVDD	Grade 1	25	5	30	0.44
	Grade 2	5	0	5	
LVSD	Mild	1	0	1	0.75
	Moderate	5	2	7	
PAH	Mild	6	0	6	0.13*
	Moderate	1	2	3	
	Severe	1	0	1	

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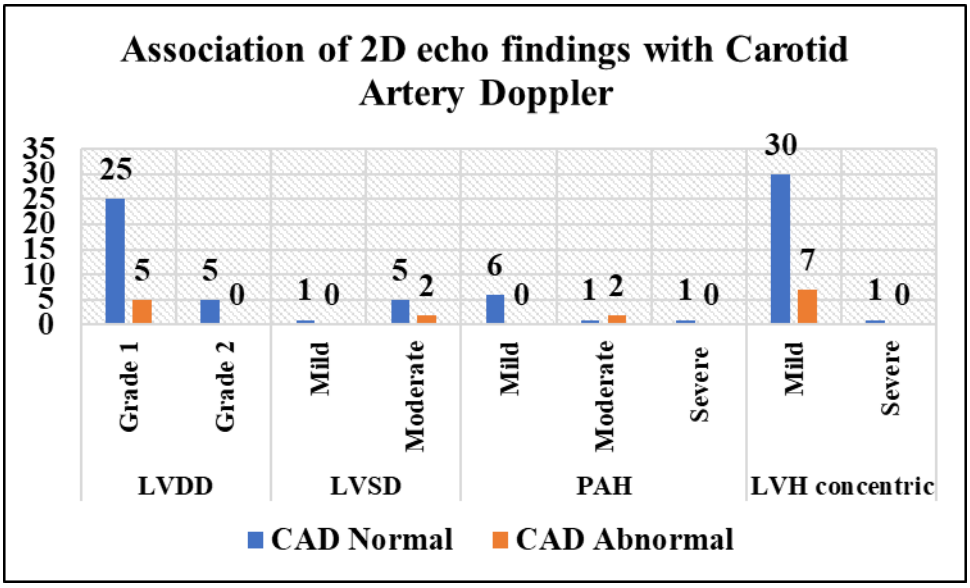
LVH concentric	Mild	30	7	37	0.82
	Severe	1	0	1	



43 patients underwent 2D echo and we found no association between these 2D echo parameters and Carotid Artery Doppler.

Table 4: Association of 2D echo findings with STAGE OF CKD

		STAGE OF CKD		Total		
		STAGE 4	STAGE 5		Percent	P value
LVDD	Grade 1	11	19	30	69.76	0.15
	Grade 2	0	5	5	11.62	
LVSD	Mild	0	1	1	2.32	0.99
	Moderate	2	5	7	16.27	
PAH	Mild	1	5	6	13.95	0.73
	Moderate	1	2	3	6.97	
	Severe	0	1	1	2.32	
LVH concentric	Mild	13	24	37	86.04	0.99
	Severe	0	1	1	2.32	

Table 5: 2d Echo Parameters And Total Cholesterol

Total cholesterol	**<150 (n=20)**	**150-199 (n=30)**	**>200 (n=8)**	**P value**

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PAH	2 (10%)	4 (13.33%)	2 (25%)	0.924
RWMA	2 (10%)	7 (23.33%)	3 (37.5%)	
LVH	11 (55%)	17 (56.66%)	5 (62.5%)	
LVDD	9 (45%)	14 (46.66%)	4 (50%)	
LVSD	1 (5%)	6 (20%)	3 (37.5%)	
DEGENERATTIVE VALVE CHANGES	3 (15%)	5 (16.66%)	1 (12.5%)	

The distribution of patients as per the values of cholesterol and 2D echo findings did not differ significantly.

Discussion

Premature cardiovascular disease is a significant cause of morbidity and mortality among patients with CKD. Premature atherosclerotic coronary disease is driven by multiple risk factors including dyslipidaemia and oxidative stress. The most common cause of morbidity and mortality in CKD patients is cardiovascular disease (CVD). The risk of mortality steadily rises with worsening CKD, even after adjusting for known CAD risk factors like diabetes and hypertension. Patients with CKD stages G3a to G4 (15-60 ml/min/1.73 m2) have approximately double and triple the CVD mortality risk compared to patients without CKD, respectively, as glomerular filtration rate (GFR) declines below 60 to 75 ml/min/1.73 m2.[15]

Four main structural abnormalities of the heart have been described in patients with CKD. LV hypertrophy, expansion of the non-vascular cardiac interstitium leading to intermyocardiocytic fibrosis, changes in vascular architecture and myocardial calcification. All these abnormalities promote systolic as well as diastolic LV dysfunction which predisposes to symptomatic heart failure, which in turn is a risk factor for premature death. Echocardiography can detect cardiac changes in early stages. Echocardiography is safe, simple and sensitive method to detect small pericardial effusion, helping to analyse the cause of chest pain and cardiomegaly and thus guide anticoagulant therapy patients who are on haemodialysis.

Total 43 patients diagnosed with chronic kidney disease were included, with mean age of 52.85 ± 13.76 years, ranging between 19 and 76 years. Most (31 (41.87%)) of the patients were in the age group of >60 years, followed by 40-60 years (29 (39.53%)) and <40 years (14 (18.60%)). Among total 43 CKD patients 15 (34.88%) were females and 28 (65.12%) were males. The patients with CKD in Kajitani N et al.'s study were older than the subjects in the current study, with a mean age of 68.5 ± 11.0 years and a predominance of men.[16] Early detection and treatment of major cardiac complications in patients of chronic renal failure may change the outcome.

A rise in the number of patients requiring kidney replacement therapy coincides with an increase in the prevalence of CKD around the world. A major public health issue on a global scale is CKD. Aging populations, a rise in the prevalence of type 2 diabetes and hypertension, and a low detection rate are all contributing factors to the rising incidence and prevalence of advanced CKD. A rise in the number

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of patients requiring kidney replacement therapy coincides with an increase in the prevalence of CKD around the world.[17] LVH was present in more than 50% of cases. Robert N Foley et al (1995)[18] found LVH in 73.9% cases, NP Singh et al found LVH in 76.92% and Zoccali et al (2000)[19] found in 77%. Patients with CKD frequently have traditional cardiovascular risk factors, and these factors play a significant role in the development of atherosclerotic vascular disease, especially in the early stages of the disease.[20]

We also haven't found any association between 2D echo findings with Carotid Artery Doppler. No association between serum cholesterol and 2D echo finding was reported in our study. According to Jungers P et al, there was no discernible difference between the CVA+ and CVA patients with CKD in terms of age, serum creatinine, or creatinine clearance (Ccr) concentration.[21]

Conclusion

Cardiac structural as well as functional abnormalities are common in patient of CKD. Diastolic dysfunction is the commonest cardiac abnormality followed by LVH. Echocardiography is cost effective and a non-invasive diagnostic test for CKD patients. This is important for early preventive measures and in checking prognosis of the disease.

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