www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i9.146

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

A study of Echocardiographic changes in patients with Chronic Kidney disease in a tertiary care centre in South Karnataka

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Abstract
Background: *Cardiovascular disease (CVD) is leading cause of morbidity and mortality in patients with CKD. This increased risk of cardiovascular disease may begin during early stage of CKD much before the onset of kidney failure. This high burden of CVD mortality is well illustrated by comparing CVD mortality in the dialysis population to the general population. The mortality due to CVD is 10 to 30 times higher in dialysis patient. Our study aim is to identify echocardiographic changes in patients with chronic kidney disease.*
Methods: *A total of 50 chronic kidney disease patients admitted to Adichunchanagiri medical college hospital, were included in this study. The patients were evaluated as per the history, general physical examination, systemic examination, blood urea, serum creatinine, urine routine and echocardiography.*
Results: *In the present study echocardiographic abnormalities were observed in 35 patients (70%). Left ventricular hypertrophy was seen in 24 patients (48%). Regional wall motion abnormalities were seen in 7 patients (14%). LA+LV dilatation was seen in 2 patients (4%). Pericardial effusion was seen in 2 patients (4%).*
Conclusions: *Left ventricular hypertrophy is the commonest morphological abnormality observed. Left ventricular dysfunction is commonest cardiovascular abnormality detected. Echocardiography is a more sensitive diagnostic procedure to detect left ventricular dysfunction.*
Keywords: *Cardiovascular Disease, Chronic Kidney Disease, Echocardiography.*

Introduction

Chronic kidney disease encompasses spectrum of different pathophysiological process associated with abnormal kidney function and a progressive decline in glomerular filtration rate[1]. It is associated with significantly increased in mortality and morbidity. It affects almost every system of the body and results in various functional and structural abnormalities.

End stage renal disease [ESRD] is the irreversible deterioration of renal functions which results into impairment of excretory, metabolic and endocrine functions leading to development of the clinical syndrome of uremia[2].

Cardiovascular diseases are the leading causes of morbidity and mortality in patients at every stage of CKD. The incremental risk of cardiovascular diseases in those with CKD compared to age and sex matched general population ranges very high depending on stage of CKD[1].

Methods

Patients admitted to Adichunchanagiri hospital and research centre (AH &RC) with chronic kidney disease.

Methods of collection of data:

A minimum of 50 patients with features suggestive of chronic kidney disease are taken.

Duration of study: November 2017 to May 2018.

Following investigations was done after detailed clinical evaluation in patients with features suggestive of CKD

1. a. Urine PH, specific gravity, protein, sugar, microscopy

b. Blood HB%, RBS, blood urea, serum creatinine, electrolyte, calcium, phosphorous.

2. Ultrasound abdomen was done using 3.5mHz transducer.

3. All patients were subjected to transthoracic echocardiography (ECHO) and Doppler evaluation using vivid VP3 High Performance Echocardio-graphy machine by GE medical system. Modified Simpson's technique was used to determine the end-diastolic volume (EDV), end systolic volume (ESV) and ejection fraction of <50% was taken as abnormal.

Study proper: Observational study

Inclusion criteria

1. All patients with CKD as per criteria with age > 18 yrs.
2. Patient with chronic kidney disease on dialysis.

Exclusion criteria

1. Acute coronary syndrome patients.
2. Congenital heart disease.
3. Valvular heart disease

Data Analysis

The Statistical software namely SPSS 18.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc**.**

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean SD (Min-Max) and results on categorical measurements are presented in Number (%).

Results

The present study comprises 50 cases of chronic kidney disease admitted to AH &RC.

Table 1: Age Distributions of Patients

Age In Years	No. Of Patients	%
20-30	5	10
31-40	6	12
41-50	15	30
51-60	10	20
61-70	12	24
>70	2	4
Total	50	**100.0**

Mean ± SD: 50.94±14.25

In the present study the age variation was from 20 to 80 yrs. Majority of the patients were in the age group of 41 -50 years, which included 15 patients (30%). The mean age of the patient was 50.94±14.25.

Table 2: Sex Distribution of Patients

Gender	No. of Patients	%
Male	33	66
Female	17	34
Total	50	100

In the present study, 33(66%) were males and 17(34%) were females. The male to female ratio is 1.94:1.

Table 3: Electrocardiographic Changes in CKD Patients

Sr. No.	Particulars	No. of Cases	Percentage
1.	Normal	20	40
2.	LVH	16	32
3.	LAD	5	10
4.	RBBB/LBBB	6	12
5.	T Wave Inversion	6	12
6.	Arrhythmia	2	4

- In the present study ECG abnormalities was observed in 30 patients (60%). Left

ventricular hypertrophy was found in 16 patients (32%).

- ❖ Left axis deviation (LAD) was seen in 5 patients (10%).
- ❖ Bundle branch block were seen in 6 patients (12%).
- ❖ T wave inversion were seen in 6 patients (12%).
- ❖ Arrhythmias (Atrial Fibrillation) was seen in 2 patients (4%).

Table 4: Echocardiodraphic Changes in CKD Patients

Echo Changes	No. of Patients	Percentage
Normal	15	30
LVH	24	48
RWMA	7	14
Dilated Chambers	2	4
Pericardial Effusion	2	4
Total	50	100

Echocardiographic abnormalities were observed in 35 patients (70%). Left ventricular hypertrophy was seen in 24 patients (48%). Regional wall motion abnormalities were seen in 7 patients (14%).Dilated chambers (DCM) were seen in 2 patients (4%). Pericardial effusion seen in 2 patients (4%).

Table 5: Stages of CKD and Echo Findings

Echo Changes	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Normal	1	-	3	6	5
LVH	-	-	1	7	16
RWMA	-	-	1	1	5
Dilated Chambers	-	-	1	-	1
Pericardial Effusion	-	-	-	-	2
Total	1	-	6	14	29

In the present study 1 patient (2%) in stage 1of CKD had normal echocardiographic findings. In stage 3, 3 patients (6%) had normal echo findings, 1 patient (2%) had LVH, 1 patient (2%) had wall motion abnormalities, 1 patient (2%) had dilated chambers.

In stage 4, 6 patients (12%) had normal echo findings, 7 patients (14%) had LVH, 1 patient (2%) had regional wall motion abnormalities. In stage 5, 5 patients (10%) had normal echo findings, 16 patients (32%) had LVH, 5 patients (10%) had regional wall motion abnormalities, 1 patient (2%) had dilated chambers, 2 patients (4%) had pericardial effusion.

Discussion

In the present study the age variation was from 20 to 80 yrs. Majority of the patients were in the age group of 41 -50 years, which included 15 patients (30%). The mean age of the patient was 50.94±14.25. The mean age of the present study was compared with other studies, the mean age in the others studies are 51±17 years in foley et al[3], 47.5 ±12.26 years in Ramanan et al[4], 47.58±15.3 years in goornavar et al[5].

In the present study male to female ratio was 1.94:1 which was 4:1 in Ramanan et al[4], 4.67:1 in chafekar et al[6], 1.08:1 in goornavar et al[5], 1.72:1 in singal et al[7].

In the present study ECG abnormalities was observed in 30 patients (60%). Left ventricular hypertrophy was found in 16 patients (32%).Left axis deviation (LAD) was seen in 5 patients (10%). Conduction abnormalities were seen in 6 patients (12%).Signs of ischemia were seen in 6 patients (12%). Arrhythmias (Atrial Fibrillation) was seen in 2 patients (4%).

The above observation made in the present study is comparable with studies done by soman et al[8] and Ramanan et al[4].

In the present study, echocardiographic parameters like LVIVS, LVPW, LVEDD, LVEF, RVID, LVESD showed left ventricular dysfunction. The values are comparable with other studies done by Ramanan et al[4], ladha et al[9], Rajesh debbarma et al[10].

In the present study, the commonest echocardiographically detected left ventricular dysfunction was left ventricular hypertrophy which was observed in 24patients (48%), which is comparable with Ramanan et al[4].

Ischemia was observed in 7 patients (14%)in present study which is comparable with Ramanan et al[4] (12%) and goornavar et al[5] (16%).

Pericardial effusion was observed in 2 patients (4%) in present study which was 6% in goornavar et al[5].

Stages of CKD and Echo Findings

As no studies are available comparing the stages of CKD and ECHO findings, In the present study in stage 4, 6 patients (12%) had normal echo findings, 7 patients (14%) had LVH, 1 patient (2%) had regional wall motion abnormalities. In stage 5, 5 patients (10%) had normal echo findings, 16 patients (32%) had LVH, 5 patients (10%) had regional wall motion abnormalities, 1 patient (2%) had dilated chambers, 2 patients (4%) had pericardial effusion.

Conclusion

Most common ECG abnormality was Left ventricular hypertrophy followed by conduction abnormalities and Regional wall motion abnormalities.

Left ventricular hypertrophy is the commonest morphological abnormality observed, followed by Regional wall motion abnormalities. Left ventricular dysfunction is commonest cardiovascular abnormality detected.

Echocardiography is a more sensitive diagnostic procedure to detect left ventricular dysfunction.

As the stages of CKD progresses more ECHO abnormalities were observed like Left ventricular hypertrophy, regional wall motion abnormalities and pericardial effusion.

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