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Original Research Paper

Nephrology

CARDIAC CHANGES IN CHRONIC KIDNEY DISEASE

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ABSTRACT **Background:** CKD is defined as abnormalities of kidney structure or function, present for 3 months, with implications for Health1.Evaluation of cardiovascular risk factors is essential, because of high rate of cardiovascular complications in CKD. CAD, congestive heart failure and pericardial disease are the common manifestations of major cardiovascular abnormalities in CKD. Cardiovascular disease accounts for 53% of all deaths with a known cause in patients on dialysis2 .Timely recognition and management of cardiovascular disease in this very high-risk population is of paramount importance. Structural and functional cardiovascular evaluation is done using X-Rays, Electrocardiography, and Echocardiography. **Aim & Objectives:** 1. To assess Cardiac changes in patients with chronic kidney disease admitted in Kamineni Institute Of Medical Sciences with a sample size of 50patients. 2. Using Electrocardiography (ECG) and Two dimensional Echocardiography (2DEcho) as diagnostic tools to detect cardiac changes in patients with Chronic Kidney Disease (CKD). **Design:** Cross sectional study. **Place Of Study:** This study was conducted in patients with CKD admitted in Kamineni Institute Of Medical Sciences Hospital, Narketpally. **Duration Of Study:** September 2020 to October 2022.

KEYWORDS : chronic kidney disease, cardiac changes , ECG changes, Ischemia.

INTRODUCTION

Chronic kidney disease is defined as abnormalities of kidney structure or function, present for more than 3 months, with implications for health. Criteria for CKD (either of the following present for >3 months) Markers of kidney damage : Albuminuria (AER >30 mg/24 hours or ACR>30 mg/g) Decreased GFR : GFR< 60 ml/min/1.73 m2 (GFR categories G3a–G5) 2.

Staging Of Ckd:

Classification of CKD is based on cause, GFR category (G1–G5), and albuminuria category (A1–A3). GFR can be estimated by using serum creatinine. In patients with decreased GFR, but no other markers of kidney damage, it requires estimation of GFR using serum Cystatin levels by 2012 CKD-EPI Cystatin C or 2012 CKD-EPI Creatinine-Cystatin C equations. If GFR by this method is less than 60 ml/min/1.73 m2, diagnosis of CKD is confirmed.

Cardiovascular Manifestations In Ckd:

Most clinical consequences of cardiac disease result from cardiomyopathy or ischemic heart disease.CKD causes accelerated atherosclerosis and arteriosclerosis.

The increased prevalence of cardiovascular abnormalities is due to traditional risk factors i.e. Hypertension, Diabetes, Dyslipidemia, obesity and non traditional (CKD related) risk factors like Anemia, Hyperphosphatemia, Hyper parathyroidism, oxidative stress and generalised inflammation .

Traditional Risk Factors I. Hypertension:

It is a strong predictor for LVH, cardiac failure, ischemic heart disease and worsening of atherosclerosis.Salt restriction should be advised in such patients to < 2gm/day of sodium1 .

II. Diabetes:

CKD patients with diabetes have higher incidence of cardiovascular co-morbidities than any other patient group.

III. Dyslipidemia:

A significantly decreased Apo A-II to Apo CIII 8 ratio is the hallmark of altered lipoprotein composition in renal disease, thereby promoting atherosclerosis.

Clinical Manifestations Of Cardiovascular System In Ckd I.hypertension:

Hypertension can either be the cause or the effect of CKD. It is due to increased extracellular volume through salt and water retention, enhanced sympathetic activity, activation of Renin Angiotensin Aldosterone system and endothelial dysfunction

II. Arteriosclerosis:

CKD patients are more prone to arteriosclerosis which leads to increased peripheral vascular resistance11. Increased peripheral resistance is characterized principally by increased diastolic pressure and mean blood pressure.

III. Left Ventricular Hypertrophy:

19 12 Left Ventricular Hypertrophy is due to excessive pressure & volume loads. Volume overload embraces increased extra cellular volume, anemia and arteriovenous fistula Concentric hypertrophy is considered an adaptive mechanism in response to chronic LV pressure over load.

IV. Cardiac Failure:

The abnormal ventricular filling in uremia results from increased LV stiffness caused by intramyocardial fibrosis and associated with delayed relaxation.

V. Ischemic Heart Disease:

During conditions requiring increased flow, a progressive relative decrease in perfusion occurs after the degree of stenosis is 40% or greater.

VI. Arrhythmias:

They are due to disturbances in serum levels of electrolytes that can affect cardiac conduction including Potassium, Calcium, Magnesium.

VII. Valvular Heart Disease:

Prevalence of aortic valve calcification in dialysis patients is 55% , similar to that in elderly general population, although it occurs 10 to 20 years earlier .

Electrocardiographic Changes In CKD:

The Echo changes in CKD can be due to i. LEFT VENTRICULAR ABNORMALITIES It can be either LV dilatation or LV hypertrophy.

AIM&OBJECTIVES:

1. To assess Cardiac changes in patients with chronic kidney disease admitted in Kamineni Institute Of Medical Sciences with a sample size of 50patients.
2. Using Electrocardiography (ECG) and Two dimensional Echocardiography (2DEcho) as diagnostic tools to detect cardiac changes in patients with Chronic Kidney Disease..

Inclusion Criteria:

1.Patients who are diagnosed with CKD with age 18 years and above, irrespective of etiology and duration.

Exclusion Criteria:

1. Known cases of Rheumatic Heart disease/ Valvular heart disease.
2. Patients with poor pulmonary function.
3. Patients with Congenital heart disease.
4. Age less than 18 years.
5. Documented Coronary artery disease prior to onset of CKD.

METHODOLOGY:

Ethical clearance was taken. Patients were enrolled into study after taking informed consent. In all patients, detailed history of illness is taken with special reference to cardiac symptoms and subjected to a complete clinical examination. Complete blood picture, Blood biochemical investigations, abdominal ultrasonography, and Chest x-ray were performed in all patients enrolled in our study. Standard 12 lead ECG was taken at a 26 paper speed of 25 mm/sec for all patients. Echocardiography was done in all patients by a single echocardiographist to minimize inter-observer variation. GFR is calculated using CKD-EPI equation.

RESULTS:

In present study of 50 patients,Age distribution of patients enrolled in this study, Majority of patients enrolled belong to 41-50 years group which is around 38%.

Table No.1 Age Distribution Of Patients:

AGE IN YEARS	MALE	PERCENTAGE	FEMALE	PERCENTAGE	TOTAL	PERCENTAGE
<20	-	-	1	2%	1	2%
21-30	-	-	-	-	-	-
31-40	3	6%	3	6%	6	12%
41-50	11	22%	8	16%	19	38%
51-60	9	18%	8	16%	17	34%
>60	6	12%	1	2%	7	14%
TOTAL	29	58%	21	42%	50	100%

In present study of 50 patients,the probable cause of CKD in patients enrolled in this study. Diabetes mellitus was the most common etiology for CKD in this study, which is around48%.

Table No. 2 Etiology Of CKD:

ETIOLOGY	NO. OF CASES	PERCENTAGE
Chronic glomerulonephritis	9	18%
hypertension	4	8%
Obstructive uropathy	4	8%
Diabetic nephropathy	24	48%
Chronic interstitial nephritis	7	14%
Polycystic kidney disease	2	4%
Total	50	100%

Table No 3 ECG Changes:

ECG PATTERN	NO.OF PATIENTS	PERCENTAGE
LVH	18	36%
LOW VOLTAGE COMPLEXES	6	12%
LBBB	1	2%
ARRYTHMIA	9	18%
ISCHEMIA	16	32%
NORMAL ECG	13	26%

In present study of 50 patients, the ECG patterns noted in our patients. LVH was the most common abnormality observed in our study population, which was present in 18 patients. Next common abnormality was ischemic changes, which is around 32%. Normal ECG was found in 26% patients.

Table No 4: Cardiac Chamber Abnormalities On Echo cardiography

ECHO FINDING	NO.OF PATIENTS	PEERCENTAGE
CONCENTRIC LVH	24	48%
DILATED LV	12	24%
DILATED LV &LA	9	18%
DILATED RA	-	-
RV ABNORMALITY	-	-
ALL CHAMBERS DILATED	5	10%

Echocardiographic abnormalities in our study group is represented in table 4, which shows that Concentric LVH is the most common abnormality found in 48% of patients in this study group.

Table 5 represents valvular abnormalities on echo cardiographic examination. It shows that mitral valve is the most commonly involved valve with regurgitation being the most common lesion.

VALVE INVOLVED	NO.OF PATIENTS	%
MITRAL	16	32%
AORTIC	5	10%
TRICUSPID	5	10%
PULMONARY	2	4%

DISCUSSION:

50 patients participated in the present study, in which Mean age was 49.9±10.06years . Most patients in this study were those who have been diagnosed with CKD in past 1 year, accounting to 48 % of total study population. All patients were anemic. Mean haemoglobin was 8.608±1.09. Most common etiology was Diabetes mellitus, found in 48% of study population.In study by Laddha et al[5] , Hypertension was the commonest etiology(37.1 %) followed by diabetes mellitus (21.4%). In study by Ramanan et al[4], Diabetes mellitus with Hypertension (44%) was the commonest etiology of CKD in their study population. In study by Goornavar et al[6] , Hypertension was the commonest etiology(50%). Variation in commonest etiology, when 40 compared to other studies can be due to regional variations in the incidence of chronic diseases, food habits and lifestyle. LVH was the most common ECG finding noted. It was observed in 36% of study population.Our study has almost similar results, when compared to study by Sachdeva et al[7,] in terms of LVH and proportion of patients with normal ECG recording. Incidence of LVH is slightly higher in our study group compared to studies by Soman et al[8]and Ramanan et al[4] , because majority of patients in our study group were incompliant to antihypertensive drugs and hemodialysis. Ischemic changes were the next common finding, seen in 32% of patients.

Echocardiography detection of cardiac changes was present in all patients.Cardiac changes were more frequent in those who were in advanced stages of CKD. Concentric LVH was the commonest finding on echocardiography, which was seen in 48% patients. In study done by Laddha et al[5], 24.3% patients had LVSD. 23% of patients in study population of Singal et al[3] had LVSD. Study done by Sachdeva et al[7] had 21.67% patients with LVSD. Our study is comparable to all these studies in terms of LVSD.Mitral valve was involved in 32% cases with regurgitation being the most common lesion. Aortic sclerosis

was noted in 10% cases. LV systolic dysfunction and diastolic dysfunction was seen in 26% and 50% of our study population respectively. Pericardial effusion was seen in 16% patients.

CONCLUSIONS

Electrocardiogram is a good tool to document changes in anatomy and effects on coronary circulation.50Transthoracic Echocardiography is a sensitive,non-invasive and affordable modality to assess cardiac function in CKD patients. Echocardiogram serves as an excellent tool for functional assessment of cardiac status, which takes the main stay of therapeutic decision and prognostic assessments. It should be used regularly in all patients of CKD for early detection of cardiac dysfunction.

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