



ECHOCARDIOGRAPHIC ASSESSMENT OF LEFT VENTRICULAR HYPERTROPHY IN PATIENTS OF CHRONIC RENAL FAILURE.

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ABSTRACT

Introduction: In the recent years, the prevalence of Chronic Renal failure has increased in the community, resulting in increasing number of admission and decreased life expectancy. Chronic Renal Failure affects almost all systems of body and results in various abnormalities. Of the various causes, infection and cardiovascular events contributes towards large proportion of increased morbidity and mortality. Left Ventricular Hypertrophy (LVH) is a major Echocardiographic finding in Chronic Renal Failure (CRF) and there is scanty information on the prevalence of Left Ventricular Hypertrophy and nature of LVH in patients with CRF. Aim of the present study is to estimate the prevalence of Left Ventricular Hypertrophy by Echocardiography in patients with Chronic Renal Failure and to find out Correlation of Left Ventricular Hypertrophy with severity of Chronic Renal Failure. **Methodology:** a cross sectional observational study done on total of 100 Chronic Renal Failure patients admitted or who visited on outpatient basis to KMC Hospital over a period of 2 years formed the study population. Detailed history, Clinical evaluation, Laboratory investigations, Echocardiography was carried out. Analysis of the data was performed using statistical package for the social sciences (SPSS) software. **Results:** The Prevalence of Left Ventricular Hypertrophy in Chronic Renal failure was 69%, consisting of 67% males and 33% females, majority of the patients age group was between 51-60 years and 61-70 years. In the present study, we found that Left Ventricular Mass Index (LVMI) which reflects Left Ventricular Hypertrophy (LVH) showed a progressive rise with increase in severity of renal failure with 17% of Mild CRF category having LVH as compared to 26% of Moderate CRF category and 57% of patients of Severe CRF category having LVH. **Conclusions:** The high prevalence of Left ventricular hypertrophy in these populations on echocardiography implies that these patients require detailed cardiovascular evaluation despite absence of symptoms, and also that various efforts aimed at prevention and control of left ventricular hypertrophy should be started early during the course of renal insufficiency.

KEYWORDS : Left Ventricular Hypertrophy, renal disease, nephrology, chronic kidney disease.

INTRODUCTION:

Chronic Renal Failure (CRF) is one of the common conditions which a physician comes across in day to day practice. Chronic Renal Failure affects every aspect of the lives of the patients who suffer it and involves all systems of body and results in various abnormalities¹.

Chronic renal failure is defined as irreversible, substantial and usually long standing loss renal function causing ill health.¹ Of the various causes, infection and cardiovascular events contributes towards large proportion of increased morbidity and mortality.^{3,5} Cardiac disease is the major cause of death in dialysis population accounting for 40 % of deaths in International registries^{2,3}.

In 1997, annual report of US Renal Data System (USRDS) revealed that morbidity in patients with CRF is attributed mainly to cardiac causes which account for 49% of the cases⁴.

Left Ventricular Hypertrophy (LVH) is a major Echocardiographic finding in Chronic Renal Failure (CRF).¹, 3, 30, 38 Prevalence of LVH increases with decline of renal function.³ Left ventricular hypertrophy is an independent predictor of survival, present in approximately 70% of patients at the initiation of dialysis⁵.

There is scanty information on the prevalence of Left Ventricular Hypertrophy and nature of LVH in patients with CRF². Echocardiography should be performed early in the course of CRF and may be valuable in the monitoring of therapy of these patients.³ Data available suggests that age, sex, hypertension, anemia are significantly associated with LVH and they are independent risk factors.

1. To Study the Prevalence of Left Ventricular Hypertrophy by Echocardiography in Patients with Chronic Renal Failure
2. To Find out Correlation of Left Ventricular Hypertrophy with Severity of Chronic Renal Failure

MATERIALS & METHODS:

Study Design And Population:

The study was observational cross sectional in nature & was undertaken to study the prevalence of left ventricular hypertrophy in patients with chronic kidney disease in KMC hospital. The study was done after obtaining approval from the ethics committee & the patient's signed consent.

Inclusion Criteria:

The study population consists of patients with mild, moderate and severe Chronic Renal Failure attending the hospital and patients on dialysis.

Where: Mild Chronic Renal Failure - includes patients with Serum Creatinine 1.5-3 mg/dl, Moderate Chronic Renal Failure -includes patients with Serum Creatinine values 3.0-6.0 mg/dl and Severe Chronic Renal Failure - includes patients with Serum Creatinine value > 6 mg/dl

Exclusion Criteria:

Patients with other cardiac disorder such as valvular heart disease, congenital heart disease Patients with poor Echo window.

Sampling Method: A convenient sampling technique was taken over a period of one year who are visited and admitted in the hospital was taken a sample for the study.

Data Collection And Interpretation:

Katuri of medical sciences attached to medical college in

Objectives:

Guntur. Nephrology department has sub-specialty of and intensive care units It serves as a referral center for other hospitals within the district.

Radiological imaging was done using 2D echo was done for patients to look for left ventricular hypertrophy among CKD patients. Complications arising from the presence of CKD like anaemia, blood urea, s.crea, s. electrolytes were checked to analyse relation.

Analysis of the data was performed using statistical package for the social sciences (SPSS) software. The analysis of the data was done by descriptive statistics with percentages and proportion.

RESULTS:

The present study comprised 100 cases of chronic renal failure admitted to KIMS Hospital, Bangalore, during the study period from December 2007 To September 2009.

1. Age Distribution:

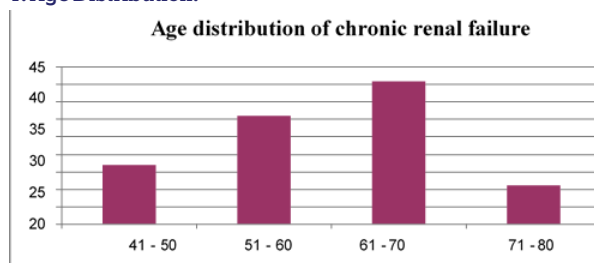


Fig- 1: Showing Age Distribution Of 100 Cases Of Chronic Renal Failure.

As shown in the fig 1 and Graph 1, in the present study the Age variation was from 41 to 80 years. Majority of patients were in the age group of 61-70 years that included 41 patients (41%).

Table 1: Showing The Gender Distribution

Gender	Frequency	Percentage
F	33	33 %
M	67	67 %
Total	100	100 %

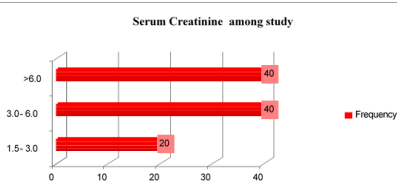
As shown in the table 1 and the present study group consisted of 67% males and 33% females.

Table - 2: Showing The Etiology Of Chronic Renal Failure

Etiology of Chronic renal failure	Frequency	Percentage
Diabetes + Hypertension	44	44 %
Diabetes Mellitus	39	39 %
Hypertension	13	13 %
APKD	2	2 %
Chronic glomerulonephritis	1	1 %
Obstructive	1	1 %
Total	100	100 %

In the present study, combined Diabetes and hypertension was the leading cause of chronic renal failure in 44 patients (44%), followed by Diabetes in 39 patients (39%), hypertension in 13 patients (13%). Adult Polycystic Kidney Disease (APKD) in 2 patients (2%), Chronic glomerulonephritis in 1 patient (1%) and obstructive pathology in 1 patient (1%) respectively.

Table 3 : Serum Creatinine Levels:



The range of serum Creatinine level in the present study was between 1.5 - 20.8 mg/dl. However, 80 patients (80%) were equally distributed in moderate and severe CRF group (i.e., 40% in each group) and remaining 20% were in the Mild CRF group

Table 4 - : Showing The Distribution Based On Creatinine Clearance

Stage	No of cases	%
Stage 1 [Signs of mild kidney disease with normal or better GFR; GFR->90%]	0	0.00
Stage 2 [Mild kidney disease with reduced GFR; GFR60- 89%]	0	0.00
Stage 3 [Moderate chronic renal insufficiency; GFR 30- 59%]	5	5.00
Stage 4 [Severe chronic renal insufficiency; GFR15-29%]	33	33.00
Stage 5 [End stage renal disease; GFR <15%]	62	62.00
Total	100	100

Electrocardiographic Changes In Crf:

Table - 5: Showing The Electrocardiographic Changes

Particulars	Frequency	Percentage
LVH	69	69 %
NO LVH	31	31 %
Total	100	100 %

In the present study, Electrocardiographic abnormalities i.e., Left ventricular hypertrophy was seen in 69 patients (69%).

Echocardiographic Changes In CRF:

Table - 6: Showing Echocardiographic Changes

Echo changes	Frequency	Percentage
NO LVH	31	31 %
LVH	69	69 %
Total	100	100 %

In the present study, out of the 100 patients with CRF, 69 patients (69%) had Left Ventricular Hypertrophy and 31 patients (31%) had no signs of left ventricular hypertrophy.

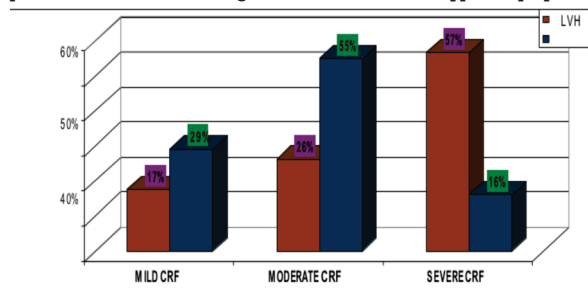


Fig - 2 Graph showing the distribution of patients based on severity of chronic renal failure with echo changes:

Table - 7 : Analysis Based On Creatinine Clearance:

Parameter	Severe (a)	Moderate (b)	Mild (d)	P-Value
Cr Clear	7.90 ± 2.94	14.93 ± 2.34	25.81 ± 9.18	α vs b < 0.001
				α vs c < 0.001
				b vs c < 0.001

In the, present study we observed that there is a significant difference in mean Cr Clear between patients with severe CRF and moderate CRF as well as mild CRF (P<0.001).

The difference in mean CRF between patients with moderate CRF and mild CRF is also statistically significant (P<0.001).

Higher mean Cr Clear is found in patients with mild CRF followed by patients with moderate CRF and severe CRF respectively and the difference in mean Cr Clear between them is found to be statistically significant.

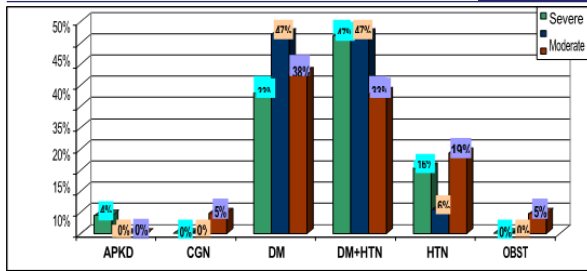


Fig – 3 Graph showing the distribution of etiology based on severity of chronic renal failure:

Table – 8 Analysis Of Echocardiographic Parameters In The Study Sample

Parameter	Severe [a]	Moderate [b]	Mild [c]	P-Value
LVIDd	4.56±0.54	4.29±0.35	4.37±0.50	α vs b <0.05* α vs c >0.05 b vs c >0.05
LVPWd	1.35±0.21	1.23±0.22	1.23±0.25	α vs b >0.05 α vs c >0.05 b vs c >0.05
IVSd	1.36±0.18	1.20±0.22	1.21±0.15	α vs b <0.01* α vs c <0.05* b vs c >0.05
LVM	243.99±73.71	195.31±65.38	204.50±57.8	α vs b <0.01* α vs c >0.05 b vs c >0.05
LVMI	153.59±36.46	120.66±38.40	123.24±8.16	α vs b <0.01* α vs c <0.01* b vs c >0.05

* Denotes a significant difference

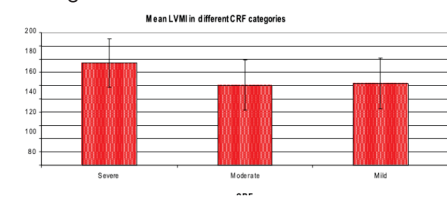


Fig – 4 Graph showing the distribution of LVMI in various grades of chronic renal failure

Higher mean LVIDd is recorded in patients belonging to severe CRF category followed by moderate and mild CRF categories respectively.

The difference in mean LVIDd between severe and moderate categories was found to be statistically significant ($P < 0.05$), but was not statistically significant between mild and moderate categories as well as mild and severe categories ($P > 0.05$). No statistically significant difference was observed in the mean LVPWd values recorded between the groups ($P > 0.05$). Higher mean LVPWd was found in patients in severe CRF category and it was almost same in patients in moderate and mild categories.

DISCUSSION:

Premature cardiovascular disease is a significant cause of morbidity and mortality among patients with CRF. Four main structural abnormalities of the heart have been described in patients with CRF: LV hypertrophy, expansion of the nonvascular cardiac interstitium leading to intermyocardiocytic fibrosis, changes in vascular architecture, and myocardial calcification.

Echocardiography provides an excellent non-invasive method to delineate details of the anatomy of cardiac cavity, wall dimensions and wall movements. It is now increasingly

used in the assessment of cardiac performance and is also invaluable in the demonstration of structural abnormalities such as LVH and pericardial effusion.

Left ventricular hypertrophy is the single strongest independent predictor of adverse cardiovascular events. LVH is a major echocardiographic finding in uremic patients. In the present study, we found that LVMI showed a progressive rise with increase in severity of renal failure. This is in concordance with the study done by Dangiri P et al², Agarwal S et al³, Adeera Levin et al⁵ who also found a similar trend of LVMI in patients of CRF.

CONCLUSION:

The present study shows that patients with Chronic Renal Failure have higher Left ventricular mass index (LVMI) and higher prevalence of Left ventricular hypertrophy (LVH), and also with respect to category of Chronic Renal Failure, the LVH prevalence progressively increases with increasing severity of Chronic Renal Failure Category.

The high prevalence of Left ventricular hypertrophy in these populations on echocardiography implies that these patients require detailed cardiovascular evaluation despite absence of symptoms, and also that various efforts aimed at prevention and control of left ventricular hypertrophy should be started early during the course of renal insufficiency, such as effective control of hypertension, anemia.

Acknowledgements:

Authors are grateful to the parents who populated this study.

Study Limitations

The important limitations of our study are its retrospective design, relatively small sample from a single centre.

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