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LEFT VENTRICULAR HYPERTROPHY; HAEMODIALYSIS PATIENTS

Dr. Bhagwan Das[1], Dr. Rafique Ansari[2], Dr. Santosh Kumar[3], Dr. Shafique-ur-Rehman Memon[4]

1. MBBS, FCPS
Senior Registrar Nephrology
Liaquat University of Medical & Health Sciences, Jamshoro
2. MBBS, FCPS
Assistant Professor Nephrology
Liaquat University of Medical & Health Sciences, Jamshoro
3. Assistant Professor Medicine
Liaquat University of Medical & Health Sciences, Jamshoro
4. MBBS, FRCS, DU
Professor of Urology
Liaquat University of Medical & Health Sciences Jamshoro

Correspondence Address:
Dr. Santosh Kumar FCPS
Assistant Professor
Med Unit 11 LUMHS, Jamshoro
dr_santosh72@yahoo.com

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ABSTRACT… Cardiovascular system diseases are playing the outstanding role in the cause of morbidity and mortality in dialysis patients. Left ventricular hypertrophy is one of the universal structural abnormalities in patients on regular dialysis. **Objective:** The target of the study was to search out the frequency of left ventricular hypertrophy in end stage renal disease patients on maintenance hemodialysis. **Study design**: Single center case-series study. **Setting:** Department of Nephro-Urology, Liaquat University of Medical & Health Sciences Jamshoro. **Period:** Begin from 1st March, 2013 to 30th August 2013. **Results:** Total numbers of patients were seventy three. Thirty three patients were male and 40 were female. Mean age of the patients was 44.19 years. High blood pressure was the most typical cause of nephropathy that is as certain in twenty 9(39.7%) cases pursue by Diabetes and Chronic Glomerulonephritis in twenty (27.4%) in each, renal stone in four (5.5%), unresolved acute renal failure four(5.5%) and Chronic Tubulointerstitial nephritis in two(2.7%) patients. Left ventricular hypertrophy was ascertained in nineteen (26%) patients. **Conclusion**: Our study concedes the high frequency of left ventricular hypertrophy in dialysis patients.

Key words: Left ventricular hypertrophy, Hemodialysis, Echocardiography, End-stage renal disease

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INTRODUCTION

Patients of maintenance hemodialysis are at increased risk of death from cardio vascular disease.[1] Diabetes, high blood pressure, chronic glomerulonephritis, chronic interstitial nephritis, nephrolithiasis are the prime causes of end-stage renal disease.[1,2]

The yearly mortality in dialysis patients from cardiovascular system diseases are much higher than in the general population, around fifty percent of the deaths in dialysis patients are the result of cardiovascular system diseases.[3,4] The foremost commonest variation is end-stage kidney disease patients on hemodialysis is left ventricular hypertrophy,[4] with influence of 75%.[3,5] More cardiovascular aberration which are seen in uremic patients are enhance in total body and vascular volume, atherosclerotic heart disease with myocardial infarction and congestive heart failure, pericardial effusion and tamponade.[6]

There are many pathophysiological elements which contribute to the development of left ventricular hypertrophy for example arterial hypertension, salt and volume over load, anemia, hyperparathyroidism and arteriovenous fistula, out of these the most important cause of LVH is arterial hypertension.[7] It has been shown that systolic blood pressure more strongly correlates with presence of LVH.[8] Left ventricular hypertrophy can be detected by clinical examination, chest X-ray, ECG and echocardiography. Out of this echocardiography is much more sensitive for detection of left ventricular hypertrophy.[9]

In beginning hypertrophy can be contemplated as convenient response to normalize stress, but is ruining as the time passes on and discrepancy between muscle mass and nutritional supply arises. Left ventricular filling is spoiled along with decline in contractility, resulting fall in cardiac output, increase incidence of arrhythmias and ischemic events.[10]

Left ventricular hypertrophy is an absolute predictor of cardiovascular morbidity and mortality in hemodialysis patients.[11] So prompt diagnosis of left ventricular hypertrophy is mandatory as treatment / preventive measures can reduce progression of disease and health cost.

It's been shown that partial correction of anemia by recombinant human glycoprotein {erythropoietin} serve to regression of left ventricular hypertrophy.[12]

Decline in left ventricular mass index can also be accomplished by correction of fluid overload by ultra-filtration during hemodialysis session.[13] Correction of abnormally high level of blood flow through arterio-venous fistula in hemodialysis patient is also accompanied by a decline in left ventricular volume and condensed left ventricular hypertrophy.[14] Long term treatment with (ACEI) angiotensin converting enzyme inhibitors motivate significant regression of left ventricular hypertrophy in uremic patients.[15]

Therefore left ventricular hypertrophy is a dynamic cardiovascular risk factor for increased morbidity and mortality in hemodialysis patients, its early detection and regression of left ventricular hypertrophy will contribute to reduction in cardiovascular mortality in uremic population.

MATERIAL AND METHODS

This study was conducted at the department of Nephro-Urology, LUMHS from 01-03-2013 to 31-08-2013.Those patients who were on maintenance hemodialysis for more than 06 months were included in the study. Diagnosis was confirmed after determining the GFR that was less than 15 ml / min / 1.73 m^2BSA from twenty four hours urinary sample. Those patients who had poor transthoracic echo images with thick or thin chest wall, chest deformities or suffering from chronic obstructive airway disease or who were on hemodialysis for less than six months or patients with no previous record were excluded from the study.

Informed consent were obtained from all patients by researcher himself and previous record was checked for diagnosis. History with special reference to the duration of hemodialysis was taken. Transthoracic echocardiography with two dimensional and M-mode echo was performed during inter-dialytic period. Measurements were taken like left ventricular end diastolic diameter, inter-ventricular septum thickness and left ventricular posterior wall thickness through left parasternal long axis or short axis just distal to the tip of mitral valve leaflet by sinologist with twelve years' experience.

All statistical analysis was done using statistical packages for social science (SPSS) for window software, version 10. Frequency and percentage were computed for categorical variables like age groups, duration of hemodialysis, gender, occupation, and causes of renal failure, LVH patients and severity of LVH patients. Mean with standard deviation, 95% confidence interval and mean were also computed for quantitative variable like age and duration of hemodialysis. Frequency of left ventricular hypertrophy in end stage renal disease patients on maintenance hemodialysis with respect to stratification of age, gender and duration of hemodialysis were also computed.

RESULTS

A total of 73 patients with end stage renal disease who were on maintenance hemodialysis for more than six month were included in this study. Most of the patients were belong to 31 to 60 years of age that is 71.3%. The mean age of the patients was 44.19±13.94 years (95%CI: 40.94 to 47.44). Similarly mean duration of hemodialysis was 19.53±18.31 months (95%CI: 15.26 to 23.81) as shown in table-I.

Out of 73 patients, 33(45.2%) were male and 40(54.8%) were female. Causes of renal failure of the patients are presented in table-II. Essential hypertension was the commonest cause of renal failure that is observed in 29(39.7%) cases followed by diabetes mellitus and chronic glomerulonephritis 20(27.4%) in each. Renal stone 4(5.5%), unresolved acute renal failure

Variables	Mean ± SD	95%CI	Median (IQR)	Range
Age (Years)	44.19±13.94	40.94 to 47.44	42 (20)	85 to 13
Duration of Hemodialysis (months)	19.53±18.31	15.26 to 23.81	12 (15)	84 to 6

Table-I. Characteristics of Study Variables (n=73)

4(5.5%) and chronic tubulointerstitial nephritis 2(2.7%) causes are also observed in this study.

Causes of Renal Failure	Count	%age
Essential Hypertension	29	39.7%
Diabetes Mellitus	20	27.4%
Chronic Glomerulonephritis	20	27.4%
Renal Stone	4	5.5%
Unresolved acute renal failure	4	5.5%
Chronic Tubulointerstitial Nephritis	2	2.7%
Renal Cyst	0	0%
Amyloidosis	0	0%

Table-II. Causes of renal failure (n=73)

Out of 73 patients, left ventricular hypertrophy was observed in 19(26%) patients. Out of these 19 LVH patients, mild LVH was seen in 16 (84.2%), moderate LVH was in 1(5.3%) and severe LVH was observed in 2(10.5%) patients as shown in figure-I.

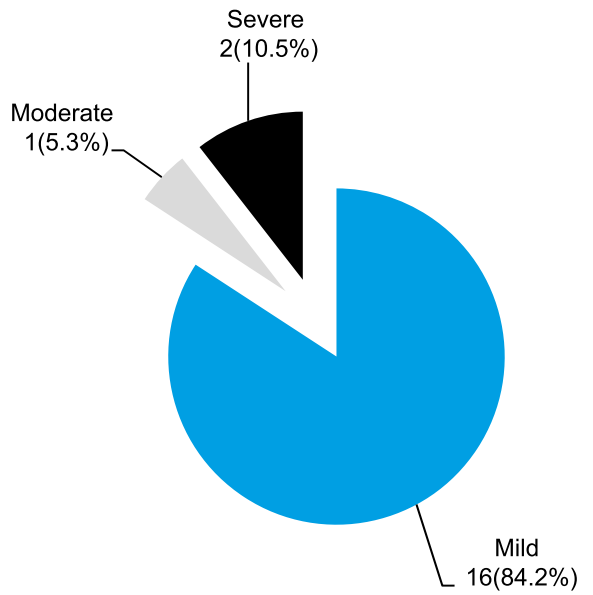

Figure-I. Harshness of left ventricular Hypertrophy in end stage renal disease patients on maintenance Haemodialysis (n=19)

Frequency of left ventricular hypertrophy in end stage renal disease patients on maintenance hemodialysis with respect to age is presented in table-3.Out of 19 LVH in end stage renal disease patients, most of the patients age were between 51 to 60 years that is 7(36.8%) and 6(31.6%) were between 31 to 40 years of age (table-III).

Stratification of age	Left Ventricular Hypertrophy	
	Yes n=19	No N=54
≤ 20 Years	0(0%)	5(9.3%)
21 to 30 Years	2(10.5%)	8(14.8%)
31 to 40 Years	6(31.6%)	15(27.8%)
41 to 50 Years	2(10.5%)	9(16.7%)
51 to 60 Years	7(36.8%)	13(24.1%)
> 60 Years	2(10.5%)	4(7.4%)

Table-III. Age Groups with Regard To Left Ventricular Hypertrophy

DISCUSSION

Left ventricular hypertrophy (LVH) is often seen in chronic hemodialysispatients.[16]the presence of LVH in dialysis patients leads to an independent relative risk of death of 2.9 for mortality related to all causes and 2.7 for cardiac related mortality.[17] In the Framingham study, the traditional population prevalence of LVH was 17%, and higher LV mass predicted a greater incidence of clinical circumstances, including death likely to cardiovascular disease.[18]

Immediate diagnosis of LVH is necessary as timely intervention maybe delay or even reverses the progression of pathological process. Chest X-ray lacks sensitivity in initial stages and it is non-specific. Although the standard 12-lead ECG remains the most widely used initial diagnostic test in the screening process for LVH. The relative poor sensitivity of both simple and complex criteria has limited the clinical utility and cost effectiveness of the ECG. Echocardiography is

the most sensitive test for detection of LVH.[19]

The echocardiographic examination of our patients was performed during interdialytic period, which is probably the most appropriate time. The LVMI changes over the dialysis session and will probably be greater just before the dialysis session.

In our study, the frequency of LVH was 26% in hemodialysis patients it is lesser than that reported by Emeka A[3] (82.9%) and by Danial K[4] (46%).

Rohmilt Este's point ECG scoring criteria in our study has 36% sensitivity and 82% specificity. Other studies have also provide the sensitivity of this criterion varying between 18 and 50%.[20, 21]

The proportion of male in our dialysis study group is 45.2%. It is quite similar reported by Choudry N[22]i.e. 43%. Hypertensive nephropathy is the most common primary renal disease (39.7%) followed by chronic glomerulonephritis (27.4%) and diabetic nephropathy (27.4%) in our study. The predominant causes of renal insufficiency were glomerulonephritis (29%) diabetic nephropathy (22%), and hypertension (20%) reported by Aness M.[23]

Systolic blood pressure and diastolic blood pressure are significantly different between those patients with and without LVH in our study. There is evidence from other major cross-sectional studies of ESRD patients that there is statistically significant difference in systolic blood pressure between LVH and non LVH group.[24]

There was no statistically significant difference in age, hemoglobin, duration of hemodialysis in our study. In some other major cross-sectional studies.

A univariate analysis of Washio et al[25]study revealed that LVMI correlated positively to the age, and negatively to the duration of hemodialysis therapy and hemoglobin level. In addition LVMI tended to correlated positively to interdialysis weight gain.

Similarly significant difference in age between LVH and non LVH group has been reported.[26] but in our study age was not significantly different between LVH and non LVH patients.

CONCLUSION

Our study reveals the greater frequency of LVH in dialysis patients. It also demonstrates that ECG is an inadequate screening test for detection of LVH. So echocardiography should be done in all clinically suspected LVH patients. It is not known whether pharmacologically induced regression of established LVH would be of benefit. Thus, strategies to prevent the development and progression of LVH may prove to be more effective than attempts to induce regression of established LVH.

Therefore we advise that blood pressure ought to be more aggressively controlled during pre ESRD state to prevent the development and progression of LVH.

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PREVIOUS RELATED STUDY

Shaheen Shah, Mahboob Ahmed Wagan, Munawar Alam Ansari, Mohd baqir Soomro. REGRESSION OF LEFT VENTRICULAR HYPERTROPHY (LVH); COMPARISON BETWEEN ACE INHIBITORS & DIURETICS (Original) Prof Med Jour 12(1) 10-13 Jan, Feb, Mar, 2005.

"Quiet people have loudest minds."

Stephen Hawking

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Bhagwan Das	Main Author	
2	Muhammad Rafique Ansari	Helped is statistical analysis	
3	Dr. Santosh Kumar	Helped is design whole study	
4	Shafique-ur-Rehman Memon	Over all supervision in writing, data, collection compleing the study.	