

Frequency of Left Ventricular Diastolic Dysfunction in End Stage Renal Disease Patients on Hemodialysis

Raheel Ahmed, Syed Munib, Tauseef Ahmed

Department of Nephrology Institute of Kidney Diseases, Peshawar Pakistan

Abstract:

Introduction: Left ventricular hypertrophy is a major risk factor for cardiovascular events in general and especially in the ESKD patients.

Objectives: to observe the true prevalence of Left ventricular diastolic dysfunction (LVDD) among maintenance hemodialysis patients.

Results: Among 138 maintenance hemodialysis patients, majority females, LVDD was observed in 87.68% patients.

Conclusion: LVDD is common among maintenance hemodialysis patients.

Key words: Left ventricular hypertrophy, left ventricular diastolic dysfunction, anemia, hypertension, end stage kidney disease, hemodialysis.

Corresponding Author

Dr. Syed Munib

Chairman & Associate Professor

Department of Nephrology Institute of Kidney Diseases,

Peshawar Pakistan

Email. munibsyed@gmail.com

DOI: 10.53778/pjkd71207

Received Aug 30, 2022 and accepted revised December 24, 2022

PJKD 2023;7(1):13-16

Introduction

Morbidity and mortality in patients with chronic kidney disease (CKD) is mainly due to cardiovascular disease. Echocardiographic documentation of left ventricular hypertrophy (LVH) is a common sign of cardiac involvement in CKD patients. Cardiorenal syndrome type 4 is defined as a state of CKD with development of cardiovascular disease upto 80% of patients and LVDD is a manifestation of cardiac involvement.¹ Half of patients with CKD in fact die of cardiovascular causes.^{2,3} Sudden cardiac death is common among ESKD patients, 28% in peritoneal dialysis patients and 29% among hemodialysis patients.³ In the famous CRIC study 75 percent of their cohort had left ventricular hypertrophy (LVH).⁴ LVH when documented suggests a higher risk of CVS morbidity and mortality and if worsening is observed then it becomes a strong predictor of sudden cardiac death.⁵

Limited literature exists in local publications regarding the cardiac structural abnormalities among hemodialysis patients. A recent study by Sabahat A. from Lahore Pakistan, noted 85.5% prevalence of LVH among hemodialysis patient and vintage of dialysis correlated with the likelihood of presence of LVH.⁶

The objective of present study was to measure the frequency of patients who develop left ventricular diastolic dysfunction (EF <45%) while being on hemodialysis for at least six months.

Methods

This Cross-sectional study (Descriptive) was conducted at Department of Nephrology, Institute of Kidney Disease Hyatabad, Peshawar between July 2018 to Jan 2019. Total sample size was 138 keeping proportion of the prevalence of LVH is estimated to be between 90% confidence interval 95% margin of error 5% using WHO calculator.⁶ Consecutive (non-probability sampling) sampling Technique was applied.

Data collection procedures:

The study was conducted after approval from Hospital ethical and research committee. All the patients who were on maintenance hemodialysis for atleast 03months were included in this study. All these patients were stabilized and after initial stabilization and treatment of these patients, written informed consent was obtained from them. Echocardiogram was performed by consultant cardiologist in order to look for the presence of LV dysfunction. LV diastolic dysfunction was considered depressed when left ventricular ejection fraction (LVEF) is found less than 45%. Clinical and electrocardiographic evidences of valvular heart disease, heart failure (EF, 50%) and myocardial ischemia was excluded from this study. Hypertension, Dyslipidemia, Diabetes Mellitus, Obesity, and Smoking Status was considered present as per operational definition. All the above information was recorded in a predesigned Performa.

Data/statistical analysis:

The data was stored and analyzed in SPSS version 17.0. Mean and standard deviation (SD) was calculated for numeric variables like age, BMI. Frequencies and percentages were computed for categorical variables like gender, occupations, hypertension, dyslipidemia, diabetes mellitus, smoking and LVDD. LVDD (left ventricular diastolic dysfunction) was stratified among age, gender, occupation, diabetes mellitus, dyslipidemia, smoking and obesity to see the effect of modifiers. Post stratification chi-square test was applied keeping P Value < 0.05 as significant. All results were presented as tables and charts.

Results

This study included 93 (67.39%) males and 45 (32.60%) females in the study population. Mean age of all the study participants was 66.00 ± 6.96 years. In this study age distribution among 138 patients was analyzed as 14 (10.14%) patients were in age range 30-50 years age group, 124 (89.85%) patients were in age range 51-70 years age group. Mean BMI was recorded as $29 \text{ kg/m}^2 \pm 1.48$. Frequencies and percentages of left ventricular diastolic dysfunction and major risk factors like hypertension diabetes mellitus, smoking and dyslipidemias are presented in Table 1. Stratification of LVDD with respect to age, gender, diabetes mellitus, occupation status, and hypertension are presented in Table No. 2.

Table 1: Frequencies and percentages for major risk factors for LVDD among maintenance hemodialysis patients.

	Yes N(%)	No N(%)
HTN	116 (84.05)	22 (15.94)
DM	96 (69.56)	42 (30.43)
Smoking	50 (36.23)	88(63.76)
Dyslipidemia	88 (63.76)	50 (36.23)
Employed	11 (7.97)	127(92.02)
LVDD	121 (87.68)	17 (12.31)

Discussion

Our study documented a high prevalence of LVH and LVDD among maintenance hemodialysis patients similar to the reported prevalence in the local and international literature. Cardiovascular risks associated with LVH and LVDD include but not limited to fluid overload, anemia, presence of inflammation, hypoalbuminemia, bone mineral disease and hypertensionetc.⁷

Majority of our patients were females and elderly compared to the population of ESKD patients reported in different studies from Pakistan, however close to the international reported mean age.^{6,8}

It is evident from studies time and again that LVH and LDD are associated with adverse morbidity and mortality and this is much higher among the patients on maintenance hemodialysis. Our study highlights the presence of high prevalence of LVDD and needs further elaboration with future studies to correlate the presence of LVDD and morbidity and mortality among hemodialysis patients especially in the younger population.

LVDD and ESKD

Table 2: Stratification of LVDD with regard to age, gender, diabetes, hypertension, and employment status.

VARIABLE	LVDD	FREQUENCIES	%
30-35 years	No	12	8.69
	Yes	02	1.44
51-70 Years	No	15	10.86
	Yes	82	59.42
Male	No	11	28.94
	Yes	39	28.26
Female	No	6	4.34
	Yes	83	60.14
DM	No	13	9.42
	Yes	38	27.53
Non DM	No	4	2.89
	Yes	9	6.52
Employed	No	2	1.44
	Yes	112	81.15
Unemployed	No	15	10.86
	Yes	104	75.36
Hypertensive	No	12	8.69
	Yes	17	12.31
Normotensive	No	17	12.31
	Yes	05	3.62

Conclusion

In Conclusion, LVDD and LVH are common among patients on maintenance hemodialysis in Pakistan.

Conflict of Interest: None to declare

Reference

1. Ronco C. The cardiorenal syndrome: basis and common ground for a multidisciplinary patient-oriented therapy. *Cardiorenal Med.* 2011;1:3 - 4.
2. Assa S, Hummel YM, Voors AA, Kuipers J, Westerhuis R, de Jong PE, Franssen CF . Hemodialysis-induced regional left ventricular systolic dysfunction: prevalence, patient and dialysis treatment-related factors, and prognostic significance. *Clin J Am Soc Nephrol.* 2012 Oct;7(10):1615-23
3. United States Renal Data System. 2018 USRDS annual data report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; Bethesda, MD 2018. Last accessed on 16 Jan , 2023.
4. Park M, Hsu CY, Li Y, Mishra RK, Keane M, Rosas SE, et al. Chronic Renal Insufficiency Cohort (CRIC) Study Group Associations between kidney function and subclinical cardiac abnormalities in CKD. *J Am Soc Nephrol.* 2012;23(10):1725.
5. Paoletti E, Specchia C, Di Maio G, Bellino D, Damasio B, Cassottana P, Cannella G . The worsening of left ventricular hypertrophy is the strongest predictor of sudden cardiac death in haemodialysis patients: a 10 year survey. *Nephrol Dial Transplant.* 2004;19(7):1829.
6. Ali S, Umar RM, Ahmed b, Ali F, Saboor QA, Pannu FY. Effect of hemodialysis duration on left ventricular hypertrophy in patients of chronic kidney disease. *Pak J Med Health Sci* 2022;16(11):238-240.
7. Nitta K, Imuro S, Imai E, Matsuo S, Makino H, Akizawa T, et al. Risk factors for increased left ventricular hypertrophy in patients with chronic kidney disease: findings from the CKD-JAC study. *ClinExpNephrol* 2019;23(1):85-98
8. Saleem M, Rehan I, Rana MA, Ahmad A, Asif M, Mehmood F et al. Early Mortality Rate in Patients Initiating Maintenance Hemodialysis in a Tertiary Care Hospital. *Pak J Kidney Dis* 2020;4(3):294-297