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A PREVALENCE STUDY OF PULMONARY HYPERTENSION IN CKD PATIENTS ON MAINTENANCE HEMODIALYSIS

Nephrology

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ABSTRACT

Objective: Chronic kidney disease (CKD)-is an emerging public health problem. Cardiovascular disease is the most common cause of mortality in CKD. Pulmonary hypertension (PH) is an overlooked cardiovascular complication of CKD, especially in end-stage renal disease (ESRD). PH is defined as "a mean pulmonary artery pressure more than or equal to 25 mmHg at rest or 30 mmHg at exercise. **Methods:** This analytical cross-sectional study was conducted in Department of Nephrology, Government Mohan Kumaramangalam Medical College and Hospital from April 2023 to March 2024. 108 patients of end stage renal disease (ESRD), on maintenance hemodialysis (HD); underwent Trans thoracic Echocardiography were selected. Pulmonary hypertension was further divided into mild (PAP b/w 30-45mmHg), moderate (PAP b/w 45-65mmHg) and severe pulmonary hypertension (PAP > 65mmHg). The effect of different vascular accesses, age, gender, dialysis vintage on the development of pulmonary hypertension was observed. **Results:** Out of 108 patients, 50 patients (54%) had pulmonary hypertension (PH); 30(60%) had moderate, 15(30%) had mild, and 5 (10%) patients had severe pulmonary hypertension (PH). Pulmonary hypertension was present in 45(50%) patients with AVF. Pulmonary hypertension was more common in females; present in 28 females (56%) and 22 males (44%), that was statistically significant ($p<0.05$). Mean duration of hemodialysis in (months) of patients with PH was 36 ± 8 vs. 12 ±7 in patients without PH ($p<0.05$). Age had no relation to development of PH. **Conclusion:** This study found a high prevalence (54%) of PH among dialysis patients. Statistically significant association was observed between presence of malnourished patient, moderate LV dysfunction, presence of concentric LVH and Pulmonary hypertension.

KEYWORDS

ESRD = End stage renal disease, PH = Pulmonary hypertension, HD = Hemodialysis, CKD = Chronic kidney disease, PAP = Pulmonary artery pressure, SPAP = Systolic pulmonary arterial pressure AVF =Arteriovenous Fistula.

INTRODUCTION

Pulmonary hypertension (PH) is defined as systolic pulmonary arterial pressure (SPAP) greater than 30 mm Hg at rest determined by Doppler echocardiography. Chronic kidney disease (CKD) is a emerging public health problem and major burden for health care. Cardiovascular disease accounts for approximately 50 percent of deaths in hemodialysis patients. Pulmonary hypertension (PH) has been described in hemodialysis patients. It is a progressive disorder with increased morbidity and mortality. Yigle et al. in the study reported a significantly lower survival rate in HD patients with PH with their counterparts without PH.

The clinical manifestations of secondary PH are frequently masked by the underlying etiology and the diagnosis may be confirmed only after the onset of right ventricular failure. Echocardiography has enabled noninvasive accurate estimation of pulmonary arterial hypertension. Pulmonary hypertension in ESRD patients may be multifactorial.

Chronic volume overload, metabolic derangements affecting pulmonary vasculature, metastatic pulmonary artery calcification, chronically increased blood flow from arteriovenous fistula, all these may predispose to elevated pulmonary pressures. We conducted a study to determine the prevalence of pulmonary hypertension in patients on maintenance hemodialysis by doing regular screening echocardiography.

MATERIALS AND METHODS

Study Design: Analytical Cross sectional study Study setting: Dept of Nephrology, Government Mohan Kumaramangalam Medical College and Hospital

Study Duration: 1 year (April 2023 – March 2024)

Inclusion Criteria

Adults aged more than 18 years, both Gender Diagnosed with CKD-stage5 [KDIG02012), on maintenance HD

Exclusion Criteria

Known case of Primary PH, Known Valvular and Congenital Heart Diseases, Chronic obstructive lung diseases

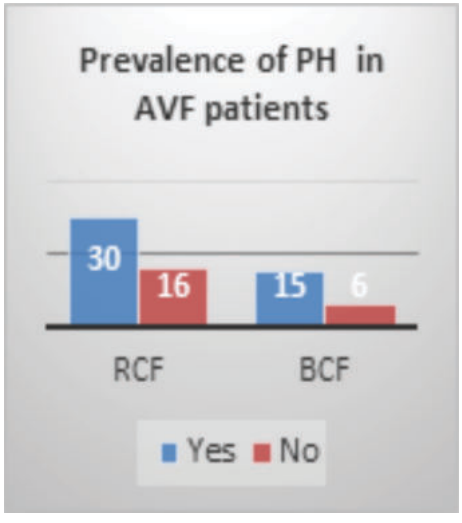
Sample Size: 108

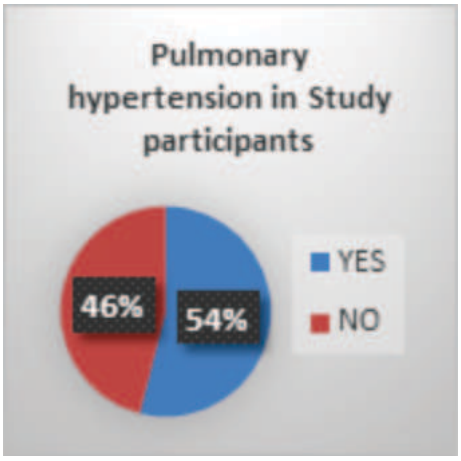
Sampling Strategy: Convenience sampling

Procedure: Echocardiogram was done for all participants Estimation of pulmonary artery systolic pressure (ePASP) Further, the mean pulmonary artery pressure (mPAP) was calculated from ePASP using a standard formula (mPAP-0.61 (ePASP)+2mmHg).

Data Retrieval and Analysis

Chi-square test and Mann Whitney U test was applied





General Characteristics Of Patients Studied

Variables	Data
Age (years) Mean±SD Range	 40.2±15.6 25-65
Sex. n% Male Female	 28 22
Hypertension Systolic Diastolic Diabetes mellitus Anemia	 80 65 35 30
Duration of CKD (weeks) Mean±SD Range	 24.76+54.5 0-416
Duration of dialysis (weeks) Mean±SD Range	 40.88±68.27 0-416
Dry weight attained, n (%)	64 (57.5)

Variables	Pulmonary hypertension		Total (N=108)	P value
	Yes (N-50)	No (N-58)		
Concentric LVH				
Present	50	56	106	0.001
Absent	0	2	2	
Ejection Fraction				
54	38	4	42	0.002
55	27	28	55	
Protein Energy Malnutrition				
Present	48	10	58	0.001
Absent	10	23	33	

RESULTS

Among the 108 patients, 50 (54%) had Pulmonary hypertension. Among them 28 were males and 22 were females. Of the 50 PH patients, 20(40%) had severe anemia, 30 (60%) had serum albumin <3.5. Among the 50 PH patients, 45 (90%) were on dialysis for less than two year Weight gain during diagnosis in kg (Mean±SD) Patients with PH (48±8) and without PH (52±6) Inter dislytic weight gain in kg (Mean±SD) Patients with PH (2.5±0.5) and without PH (2.2±0.7)

DISCUSSION

The findings of this study highlight the prevalence of pulmonary arterial hypertension among patients with CKD on maintenance hemodialysis with 54% participants exhibiting PAH. The presence of PAH in CKD patients is likely multifactorial influenced by volume overload, anemia and malnutrition. Increased age with more cardiovascular changes including stiffening of pulmonary artery was associated with pulmonary hypertension. This study has limitation of small sample size need to be emphasized.

CONCLUSION

We conclude that PH is a significant problem in ESRD patients undergoing HD that needs to be addressed in a timely manner in order to avoid high risk of morbidity and mortality. This study found a high prevalence (54%) of Pulmonary Hypertension among dialysis. patients Statistically significant association was observed between presence of PEM, Low EF, presence of concentric LVH and Pulmonary hypertension.

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