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ORIGINAL ARTICLE

Frequency of Pulmonary Hypertension in Patients with Chronic Kidney Disease Undergoing Hemodialysis

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ABSTRACT

Objective: To determine the frequency of pulmonary arterial hypertension (PAH) in patients with chronic kidney disease (SKD) undergoing hemodialysis.

Materials and Methods: A total number of 80 patients of age 16-75 years, either gender presenting with CKD undergoing hemodialysis were included. This study was conducted in the department of nephrology of Nishtar Hospital Multan from June-2021 to February 2022. The patients underwent echocardiography. If there was pulmonary artery systolic pressure >35 mm Hg, then pulmonary hypertension was labeled.

Results: Mean age of patients was 48.67±11.71 years. Mean BMI patients was 24.79±3.25 kg/m^2. There were 57 (76.00%) males and 18 (24.00%) female patients. 31 (38.8%) out of 80 patients were smokers, diabetes was found in 35 (43.8%) patients. Hypertension was found in 53 (66.3%) patients. Mean pulmonary artery systolic pressure were 29.47±9.16 mmHg. PAH was found in 15 (18.75%) patients.

Conclusion: PAH is a common disorder in patients of CKD undergoing maintenance hemodialysis and more than 18% of CKD patients undergoing maintenance HD had PAH.

Keywords: Pulmonary hypertension, chronic kidney disease, hemodialysis.

INTRODUCTION

Chronic kidney disease (CKD) is a serious public health concern, both because of the enormous number of individuals who are affected and because of the expensive expense of medical treatment and care. Because people with CKD are more likely to die from heart disease than from renal failure, it's probable that the severity of the condition was overstated in this case.[1] Pneumonia arterial hypertension (PAH) is a condition that has only recently been recognised in people with CKD.[2] The presence of an antinuclear antibody in patients with pulmonary arterial hypertension has been associated to a higher than average mortality rate in this rare disease. Patients with CKD are more likely to develop pulmonary hypertension, which is only rarely life-threatening in its severity.[3]

CKD patients prior to the start of dialysis or while on dialysis patients are more likely to develop PAH, which can cause ventricular dysfunction, which in turn can affect other organs and lead to higher mortality and morbidity.[1,2]

Right-heart catheterization is the gold standard for identifying if a patient has PAH.[4-6] Because right-heart catheterization is both expensive and difficult to execute, echocardiography has been suggested as a potential approach for the identification of PAH, with a sensitivity and specificity of 83 percent and 72 percent, respectively.[6,7]

Specifically, the purpose of this study is to investigate the prevalence of PAH in patients with CKD who are undergoing hemodialysis. Unfortunately, there are only a few published data on the prevalence of PAH in hemodialysis patients in the Pakistan. To prevent PAH in dialysis patients, it is critical to recognise and manage this potentially life-threatening illness in these patients. In this study we determined the frequency of PAH in patients with CKD undergoing hemodialysis.

MATERIAL AND METHODS

This study was conducted in the department of nephrology of Nishtar Hospital Multan from June-2021 to February 2022. A total of 80 patients of age 16-75 years, either gender presenting with chronic kidney disease undergoing hemodialysis were included. Patients with chronic pulmonary disease or hypertension or already taking treatment of pulmonary hypertension were excluded. Informed consent was obtained before inclusion in the study. Demographic information including name, age, gender, BMI, duration of dialysis, h/o smoking (>5 pack year), diabetes (BSR>200mg/dl), hypertension (BP≥140/90mmHg), h/o alcoholism, was also noted. Then patients underwent echocardiography by using Acuson Sequoia, 512 (Mountain View, CA, USA) ultrasound machine by a consultant radiologist having a least four-year experience radiology. If there was pulmonary artery systolic pressure >35 mmHg PAH was labeled. Patients with pulmonary hypertension were managed as per standard protocol.

Data was entered and analyzed through in SPSS version 20. PAH were presented as frequency and percentage.

RESULTS

Mean age of patients was 48.67±11.71 years. Mean BMI patients was 24.79±3.25 kg/m^2. Mean duration of dialysis was 3.69±1.68 months. There were more males as compared to the females. There were 57 (76.00%) males and 18 (24.00%) female patients (Figure 1). 31 (38.8%) out of 80 patients were smokers, diabetes was found in 35 (43.8%) patients. Hypertension was found in 53 (66.3%) patients.

Mean pulmonary artery systolic pressure was 29.47±9.16 mmHg. PAH was found in 15 (18.75%) patients (Figure 2).

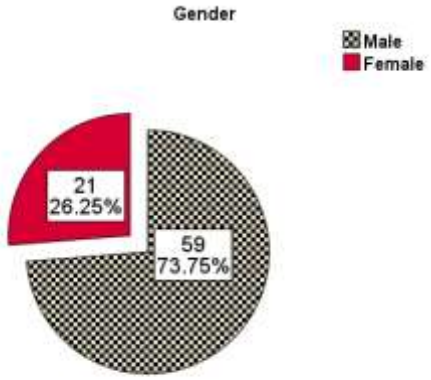

Figure 1. Frequency of Gender.

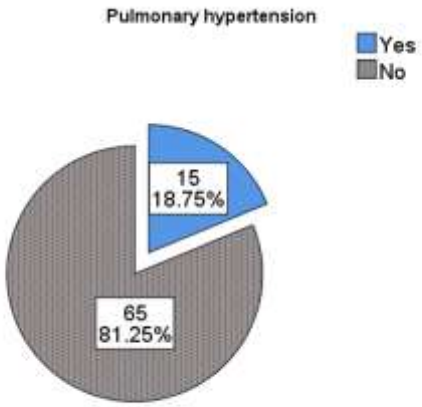

Figure 2. Frequency of PAH.

DISCUSSION

Despite the fact that continuous dialysis helps patients with chronic renal disease live longer, their prognosis is catastrophic and significantly worse than that of the general population.[8,9] According to a research from the United States Renal Data System, these patients have a survival rate of roughly 8 and 4.5 years for those aged 40 to 44 and 60 to 64 years, respectively, which is much lower than the general population survival rate. In those with chronic kidney disease (CKD), the increasing prevalence and severity of cardiovascular disorders, particularly PAH, is a strong predictor of poor prognosis.[10]

Based on the presence of causes or risk factors, PAH has been classified into two kinds (primary PH and secondary PH). PAH may be caused by the adverse effects of renal failure in CKD patients.[11] Furthermore, due to the associated complication of right heart failure, PAH is regarded as one of the leading causes of death in various illness situations.[12] As a result, data on the prevalence of APH or PASP among dialysis patients is critical for developing guidelines for the management of complications in CKD patients receiving hemodialysis.

There have been a number of studies that have looked into the relationship between PAH and overall survival in people with chronic kidney disease. According to the findings of these research, PAH is associated with an increased all-cause mortality in these individuals, particularly in the elderly. According to the findings, its link with poor survival may continue beyond dialysis and may even persist after kidney transplantation.[13,14]

In present study PAH was diagnosed in 17.33% patients of CKD who were routinely undergoing maintenance hemodialysis.

A recent study by Zhang et al. on prevalence and risk factors of PH in CKD including 491 patients reported PH in 34.6% patients.[15]

A study conducted in India by Suresh et al. reported PH in 43.5% patients of CKD undergoing maintenance hemodialysis.[16]

Another study conducted in Iran reported PH in 62.3% patients of CKD who were on maintenance hemodialysis.[17]

While a study by O'Leary et al. reported very high frequency of PH in CKD patients, they reported PH in 68% patients of CKD.[18]

It has been proposed that the coexistence of PAH and CKD can be explained by a number of different pathways. Besides serving as a signal of declining renal function, FGF-23 has recently been related to the development of left ventricular dysfunction. CKD and pre-capillary PH patients had greater levels of FGF-23, which has been shown to be related with a worse prognosis in previous studies. Consequently, it is possible that FGF-23 will have an impact on either direct or indirect pulmonary vascular remodelling, such as in the development of left heart disease, which will in turn lead to pulmonary vascular remodelling in those who are genetically prone to it.[19,20]

It has also been proposed that increases in cardiac output caused by arteriovenous (AV) access may have a role in the development of PAH in these patients.[21] According to the findings of Dolmatch et al, an AV fistula was responsible for the high PAP and cardiac output, which returned to normal following the closure of an AV fistula that was still working well.[22] Despite the fact that the results of these experiments are intriguing, this idea has not been supported by additional investigations. As a result, it is plausible that other processes, or maybe all of these mechanisms, may have a role in the development of PHT in CKD patients.

In fact, PHT is related with poor outcomes, including decreased survival and increased all-cause mortality in patients with chronic kidney disease. According to the findings, its link with poor survival may continue beyond dialysis and may even persist after kidney transplantation. As a result, prevention, early detection, and treatment of PHT are all desirable goals for improving the overall survival of these patients. However, only a few small studies in Pakistan have been able to determine the true prevalence of PHT and the link between it and chronic renal disease in this population.

CONCLUSION

PAH is a common disorder in patients of CKD undergoing maintenance hemodialysis and more than 18% of CKD patients undergoing maintenance HD had PAH.

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