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Prevalence of Pulmonary Hypertension in Chronic Kidney Disease Patients at a Tertiary Care Hospital

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Abstract:

Objectives: Pulmonary hypertension (PH) is frequently observed in Chronic kidney disease (CKD) patients. PH is associated with significant morbidity and mortality. This study evaluates the frequency of PH in CKD patients presenting to a tertiary care hospital.

Methods: CKD stage 3-5 patients were evaluated for the presence of PH and its associated risk factors. Echocardiography was performed in all these patients and presence of PH was assessed with other risk factors.

Results: Almost half of patients had PH. Increasing CKD stage was associated with presence of PH.

Conclusion: PH is common among patients with CKD. Evaluation for presence of PH and its management can help in improving the overall survival of patients with CKD.

Key words: Pulmonary hypertension, chronic kidney disease, mortality, morbidity, dialysis, arteriovenous fistula.

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Introduction:

Chronic kidney disease (CKD) is a major communicable diseases now worldwide. CKD progression is associated with metabolic waste accumulation and fluid, leading to stress on the cardiovascular system and ultimately dialysis or transplant.[1,2] Pulmonary hypertension (PH) is also frequently seen in patients with CKD and End Stage kidney disease (ESKD). PH may be the sequalae of chronic fluid overload, left ventricular failure and arteriovenous fistula flow into the pulmonary circulation. [3,4]

There are several reports that have emphasized the enhanced probability of PH in CKD communities. As an example, a research by Mirza et al. has seen that the prevalence rate of PH

in a group of Pakistani CKD patients receiving dialysis was 45 percent.[2] PH has been reported to deteriorate the quality of life and is an indicator of higher mortality and morbidity in patients with CKD.[5,6] We do not have data about PH from the southern part of our country this study tends to evaluate the frequency of PH from our region.

Methods

This research was conducted in Nephrology Department of Nishtar Medical College, Multan, Pakistan, between December 2020 and June 2021. IRB approval was obtained before induction of patients, (Dated Nov 20, 2020; NMU/IRB/2020/PH-CKD-117). One hundred and ninety-four patients with CKD aged 20-60 years, stage III-V, and a history of CKD for six months or more were recruited. Patients with known, cardiac and pulmonary diseases as well as patients with bleeding diathesis or malignancy were excluded.

An expert cardiologist conducted a cardiac echocardiography. PH was described as:
1. Pulmonary artery systolic pressure Greater than 35 mmHg
2. The velocity of tricuspid regurgitation >3.4 m/s

Data were analyzed using SPSS version 22 (IBM Corp. Armond, NY, USA). The presence of pulmonary hypertension (PH) was assessed in relation to categorical patient characteristics (such as sex, smoking status, diabetes, and CKD stage) using Chi-square tests of independence. A p-value < 0.05 was considered statistically significant. For significant associations, Cramér's V was computed to estimate the strength of association between variables, with interpretation guided by conventional thresholds for small ($V \geq 0.1$), moderate ($V \geq 0.3$), and large ($V \geq 0.5$) effects.

Results

Pulmonary hypertension (PH) was present in 91 out of 194 patients (46.9%). The presence of PH was significantly associated with several clinical variables.

PH was more common in male patients than females ($p = 0.001$), corresponding to a Cramér's V of approximately 0.24, indicating a small to moderate effect size. A significant association was also found with smoking history ($p = 0.026$, Cramér's V ≈ 0.16) and diabetes mellitus ($p = 0.002$, Cramér's V ≈ 0.22). Patients with stage V CKD were significantly more likely to have PH ($p = 0.001$, Cramér's V ≈ 0.24), again suggesting a small to moderate association. No significant relationship existed between PH and hypertension and obesity.

Discussion

Almost half of our CKD patients (46.9%) had PH, that is close to the 45 percent prevalence of PH seen in Peshawar by Mirza et al. and more recently by Khemchandni M etal.[2,7] It has been shown that PH is more prevalent in males (60.8%) as well as in patients with diabetes or smoking history.[8,9,10]

Patients were more prone to PH with increasing stages of CKD in our analysis, however the PH severity does not pose an increased risk for CKD progression.[6] It is however possible to relate advancing stages of CKD that contributes to fluid overlaod with deceasing urine output and creation of arteriovenous fistula pouring in a significant amount of blood return to the pulmonary circulation.[3,9,11] Participants of our study had higher prevalence of obesity and hypertension, but these two conditions did not show a significant association with PH in this group, as was reflected in some other studies.[11]

It is suggested that early detection and management with the help of cardiovascular and pulmonary consultation will help in improving the quality of life and improve overall morbidity and mortality.[11] Management of PH and echocardiography at regular intervals along with the management of other risk factors such as hypertension, diabetes mellitus and cardiac disease will improve the outcome in patient with CKD.

Conclusion

PH is a frequent occurrence among patients with CKD and echocardiography can help in diagnosing at an early stage and improve mortality. Further long term studies are needed to assess the extent of the PH and its contribution to the mortality in in our CKD population.

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