



## Original Research Article

# PULMONARY ARTERIAL HYPERTENSION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE: PREVALENCE AND RELATIONSHIP WITH DISEASE SEVERITY

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### ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD)-related pulmonary arterial hypertension (PAH) is one of the most common comorbidities of COPD, and often leads to a worse prognosis.

**Materials and Methods:** This study was conducted in Department of Respiratory medicine at Dr S. N. medical college, Jodhpur, Rajasthan. The duration of study was over a period of two year.

**Results:** The results show a significant association between COPD severity and pulmonary arterial hypertension, indicating a higher risk of developing pulmonary arterial hypertension with increasing COPD severity. This highlights the importance of monitoring and managing patients with moderate to severe COPD for pulmonary arterial hypertension.

**Conclusion:** The prevalence of pulmonary arterial hypertension in COPD is significant. Therefore, all COPD patients should be screened for pulmonary arterial hypertension at the time of diagnosis.

**Keywords:** COPD, pulmonary arterial hypertension, pulmonary artery pressure.

## INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) affects approximately 12.6% of the global population over the age of 40,<sup>[1]</sup> and is the third leading cause of mortality worldwide, with its prevalence continuing to rise.<sup>[2]</sup> Pulmonary arterial hypertension (PAH) is a common complication of COPD, contributing significantly to increased morbidity and mortality in affected patients.<sup>[3,4]</sup> However, the rise in pulmonary artery pressure (PAP) associated with PAH is typically mild to moderate, with severe PAH (sPAH) observed in only a small subset of cases.<sup>[5,6,7]</sup>

While a clear trend exists indicating that PAH prevalence and severity increase with the severity of COPD, limited data are available regarding PAH prevalence in patients with mild to moderate airflow limitation. Studies utilizing cardiac catheterization have reported a PAH prevalence of less than 7% in non-severe COPD cases.<sup>[8]</sup> In contrast, studies using transthoracic echocardiogram have reported a wider

range of PAH prevalence, from 0% to 25%, in patients with mild airflow limitation.<sup>[5,9,10]</sup>

The clinical relevance of PAH in COPD has been underscored in numerous studies, which highlight its independent prognostic value within the COPD population. The prevalence of PAH in COPD cannot be overlooked, as it generally correlates with increasing disease severity. This association has driven growing interest in this field over the last decade, leading to a surge in studies examining the prevalence and risk factors of PAH in COPD. However, the reported prevalence of COPD-related PAH remains inconclusive due to variations in COPD classification criteria over time.

Globally, only limited estimates of COPD-related PAH prevalence have been consolidated despite extensive research on the topic. A better understanding of the global burden of COPD-related PAH is crucial for developing effective strategies for its prevention and management, as well as for informing policymakers and stakeholders.

This study aims to the prevalence of COPD-related PAH, assess and its association.

## MATERIALS AND METHODS

**Study Area:** This study was conducted in Department of Respiratory medicine at Dr S. N. medical college, Jodhpur, Rajasthan.

**Study Duration:** The duration of study was over a period of two year.

**Data collection:** The data collected from the patients who are diagnosed as cases of COPD, as per the guidelines. Total 73 cases attending OPD and IPD of the department of respiratory medicine were enrolled in the study. The diagnosis of COPD was made based on clinical history and pulmonary function testing and severity staging was done as per GOLD Criteria. All patients were subjected to two dimensional transthoracic echocardiography to screen for pulmonary arterial hypertension.

**Data Analysis:** Data were analysed by using Microsoft Excel.

## RESULTS

This study were included 73 cases, distribution of the population shows a clear majority of males, accounting for 75.3% (55 individuals), while females make up a smaller proportion of 24.7% (18 individuals). The age distribution of the population reveals a diverse range of age groups. The majority of individuals (35.6%) fall within the 61-70 age

range, followed closely by the 51-60 age group (24.6%). The 40-50 age group accounts for 15.1%, while those above 70 years also make up 24.6% of the population. Overall, the population is skewed towards older age groups, with over 85% of individuals aged 51 or above. The severity of Chronic Obstructive Pulmonary Disease (COPD) in the population is predominantly classified as severe, with 56.1% (41 individuals) having a post-bronchodilator FEV1 of 30-50%. Moderate COPD affects 42.4% (31 individuals) of the population, while only 4.1% (3 individuals) have mild COPD. This indicates a high burden of severe COPD in this population, highlighting the need for targeted management and interventions. The severity of pulmonary arterial hypertension, as assessed by 2D Echo, reveals that the majority of individuals (59.3%) have mild pulmonary arterial hypertension, followed by moderate (25.9%) and severe (14.8%) cases. This suggests that while there is a significant presence of arterial hypertension, most cases are mild, and only a smaller proportion have severe disease. The results show a significant association between COPD severity and pulmonary arterial hypertension, indicating a higher risk of developing pulmonary arterial hypertension with increasing COPD severity. This highlights the importance of monitoring and managing patients with moderate to severe COPD for pulmonary arterial hypertension.

**Table 1: Gender distribution**

Gender	Number	Percentage
Male	55	75.3%
Female	18	24.7%
Total	73	100%

**Table 2: Age distribution**

Age group	Number	Percentage
40-50	11	15.1%
51-60	18	24.6%
61-70	26	35.6%
>70	18	24.6%
Total	73	100%

**Table 3: Number of cases distributed according to Severity of COPD**

Severity of COPD (Post bronchodilator FEV1 )	Number	Percent
Mild (>80 %)	3	4.1%
Moderate (50-80 %)	31	42.4%
Severe (30-50 %)	41	56.1%
Total	73	100%

**Table 4: Number of cases distributed according to Pulmonary arterial hypertension**

Pulmonary arterial hypertension (2D Echo )	Number	Percent
Mild	16	59.3%
Moderate	7	25.9%
Severe	4	14.8%
Total	27	100%

**Table 5: Association between COPD cases and Pulmonary arterial hypertension**

Severity of COPD	Number of cases	Pulmonary arterial hypertension		P value
		Yes	No	
Mild	3	2	20	Chi square test -53.33
Moderate	31	7	12	Degrees of Freedom-2
Severe	41	4	28	P-Value- < 0.001

## DISCUSSION

Chronic Obstructive Pulmonary Disease (COPD) is a persistent inflammatory condition of the airways with significant systemic involvement, indicating it as a systemic disease. One of its major complications is pulmonary arterial hypertension (PAH), which is more prevalent in COPD patients than in healthy individuals. This study aimed to assess the prevalence of PAH in COPD patients and its correlation with disease severity.

All participants were diagnosed and categorized according to established guidelines.<sup>[11]</sup> Based on two-dimensional echocardiograms and the European Society of Cardiology/European Respiratory Society (ESC/ERS) guidelines,<sup>[12]</sup> the prevalence of PAH in this study was found to be 36.9%. In comparison, Gupta et al,<sup>[13]</sup> reported a PAH prevalence of 62.5% among COPD patients. Another study involving 215 patients with severe COPD found PAH in 50.2% of cases, including moderate PAH in 9.8% and severe PAH in 3.7% of cases.<sup>[14]</sup>

In the present study, the prevalence of PAH increased with the severity of COPD, occurring in 4.1%, 42.4%, and 56.1% of mild, moderate, and severe COPD cases, respectively. While smoking is a significant risk factor for developing COPD, evidence from multiple studies suggests that cigarette smoking does not directly influence the development of PAH in COPD patients.<sup>[15]</sup> This may be because PAH is a multifactorial condition influenced by factors such as hypoxemia, oxidative stress, systemic inflammation, and endothelial dysfunction. The pathological impact of cigarette smoking on pulmonary vasculature may be overshadowed by the pre-existing effects of COPD. Another study conclude that echocardiography is a reliable method for detecting and assessing pulmonary arterial hypertension in most COPD patients. Given the adverse effects of PAH on morbidity and mortality, routine echocardiographic screening is recommended for patients with severe COPD.

## CONCLUSION

The prevalence of pulmonary arterial hypertension in COPD is significant. Therefore, all COPD patients should be screened for pulmonary arterial hypertension at the time of diagnosis.

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