



PREVALENCE OF PULMONARY ARTERIAL HYPERTENSION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

General Medicine

Dr Saloni Narang DNB, Department of General Medicine, Bokaro General Hospital, Jharkhand.

Dr. Anil K Agarwal Addl. CMO M&HS, Department of General Medicine, Bokaro General Hospital, Jharkhand.

Dr. Mohd. Akram DNB, Department of General Medicine, Bokaro General Hospital, Jharkhand.

ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) is a significant cause of morbidity and mortality worldwide. Systemic manifestations of COPD such as cardiovascular diseases, including pulmonary arterial hypertension (PAH), are responsible for almost 50% of deaths in advanced stages of the disease. The study aimed to evaluate the prevalence of PAH and its association with the severity of COPD in patients. **Methodology:** A prospective, observational, cross-sectional study was conducted on 100 COPD patients at a tertiary care center in India. The prevalence of COPD in the hospital was 20%. Sample size was calculated using the formula $n = Z^2PQ/d^2$. The study included patients after obtaining written informed consent and approval from the Institutional Ethics Committee and Review Board. **Results:** The mean age of the patients was 51.83 ± 10.14 years, with 63% of males and 37% of females. The mean PASP, MPAP, and RAP values were 38.93 ± 19.95 mmHg, 28.80 ± 7.90 mmHg, and 7.64 ± 3.86 mmHg, respectively. The study found that 63% of the patients had PAH, while the remaining 37% did not. Among these, 60% had mild PAH, 16% had moderate PAH, and 24% had severe PAH. **Conclusion:** PAH is prevalent in COPD patients, and its severity is associated with the severity of COPD. Early detection of PAH in COPD patients can improve outcomes, and further research is required to explore this relationship.

KEYWORDS

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality across the globe. According to World Health Organization estimates, 65 million people have moderate to severe COPD. More than 3 million people died of COPD in 2005 corresponding to 5% of all deaths globally and it is estimated to become the third leading cause of death by 2030.¹ Most of the information available on COPD prevalence, morbidity and mortality comes from high-income countries. Even in those countries, accurate epidemiologic data on COPD are difficult and expensive to collect. However, it is known that low-and middle-income countries already shoulder much of the burden of COPD with almost 90% of COPD deaths taking place in these countries.^{2,3}

Chronic obstructive pulmonary disease is associated with significant extrapulmonary (systemic) effects among which cardiac manifestations are most common. COPD is now considered a systemic disease with widespread extra pulmonary manifestations. Some comorbidities are caused by COPD itself, the others result because of common risk factors or due to systemic inflammation. In more advanced disease, systemic manifestations account for almost 50 % of deaths in COPD and cardiovascular diseases alone accounts for 20%-25% of all deaths in COPD.⁴ One established vascular complication of COPD is the development of pulmonary hypertension (PH). Typically, PH appears when airflow limitation is severe and is associated with hypoxaemia. Pulmonary hypertension is a serious complication of COPD and is associated with poor prognosis.⁵

The present study was done at our tertiary care centre to assess the prevalence of pulmonary arterial hypertension in COPD patients and to see the association of severity of COPD and Pulmonary Arterial Hypertension (PAH) in patients

METHODOLOGY

A hospital based prospective, observational, cross sectional study was conducted with 100 patients to analyze the prevalence of pulmonary arterial hypertension (PAH) in chronic obstructive pulmonary disease (COPD) patients.

The total study population available was 500. Prevalence of COPD patients in our hospital is 20%. For the current study, sample size was calculated by using the following formula:

$$n = \{z^2 p(1 - p)\} / d^2$$

where

n=sample size for current study

Z = Z Statistics for level of confidence (i.e. 1.96 for 95% confidence level)

p= Expected prevalence or proportion = 20% = 0.2

d= Precision = 0.078

Therefore,

$$n = [(1.96)^2 (0.2)(1 - 0.2)] / (0.078)^2 = 100.009 \approx 100$$

Hence, sample size taken for this study was 100 patients.

The study was done at our tertiary care center in the Department of General Medicine, Bokaro General Hospital, Bokaro Steel City, Jharkhand, India, after due approval from the Institutional Ethics Committee and Review Board and after taking written informed consent from the patients.

RESULTS-

Majority of the patients (45%) were in the age group of 56-65 years followed by 28% in the age group of 46-55 years, 21% in the age group of 36-45 years, 4% in the age group of 26-35 years and 2% in the age group of 18-25 years. The mean age of the patients was 51.83 ± 10.14 years (Table 1)

Table 1 : Distribution of patients according to gender

Gender	n	%
Male	63	63%
Female	37	37%
Total	100	100%

There was a male preponderance (63%) in our study while female patients constituted the remaining 37% of the study group (Table 2)

Table 2 : Distribution of patients according to age

Age (years)	n	%
18-25 years	2	2%
26-35 years	4	4%
36-45 years	21	21%
46-55 years	28	28%
56-65 years	45	45%
Total	100	100%
Mean $\pm$ SD	51.83 ± 10.14	

In our study, the mean Pulmonary Artery Systolic pressure (PASP), mean pulmonary arterial pressure (MPAP) and mean right arterial pressure (RAP) values of patients were 38.93 ± 19.95 mm of Hg, 28.80 ± 7.90 mm of Hg and 7.64 ± 3.86 mm of Hg respectively. (Table 3)

Table 3 : Distribution of patients according to Echocardiographic findings

Echocardiographic findings	Mean	SD
----------------------------	------	----

PASP (mm Hg)	38.93	19.95
MPAP (mm Hg)	28.80	7.90
RAP (mm Hg)	7.64	3.86
TR velocity (m/s)	2.97	0.51
TAPSE (cm)	1.40	0.30

PASP – Pulmonary Artery Systolic Pressure; MPAP – Mean Pulmonary Arterial Pressure; RAP – Right Arterial Pressure; TR – Tricuspid regurgitation; TAPSE – Tricuspid annular plane systolic excursion

In our study, 63 (63%) patients had pulmonary arterial hypertension (PAH), while echocardiography did not show PAH in the other 37 patients. Of these 63 patients, 38 (60%) had mild degree of PAH (mean PASP 41.32±2.30 mm of Hg), 10 (16%) had moderate degree of PAH (mean PASP 55.60±5.27 mm of Hg) and the remaining 15 (24%) had severe degree of PAH (mean PASP 74.07±3.49 mm of Hg) (Table 4, Table 5)

Table 4 : Distribution of patients according to incidence of Pulmonary Arterial Hypertension (PAH)

PAH	n	%
No evidence	37	37%
Present	63	63%
Total	100	100%

Table 5 : Distribution of patients according to severity of PAH

Severity of PAH	n=63	%
Mild	38	60%
Moderate	10	16%
Severe	15	24%
Total	63	100%

Table 6 : Association of severity of COPD and Pulmonary Arterial Hypertension (PAH) in patients

Pulmonary Arterial Hypertension (PAH)	COPD								Total (n=100)	p Value	
	Mild (n=42)		Moderate (n=28)		Severe (n=14)		Very Severe (n=16)				
	n	%	n	%	n	%	n	%	n		%
No PAH	24	57.2%	8	28.6%	4	28.6%	1	6.2%	37	37%	<0.05
Mild PAH	18	42.8%	17	60.7%	3	21.4%	0	-	38	38%	<0.05
Moderate PAH	0	-	3	10.7%	7	50%	0	-	10	10%	<0.05
Severe PAH	0	-	0	-	0	-	15	93.8%	15	15%	<0.05

On applying Chi-Square test, the above-mentioned findings showed a statistically significant inverse relationship between the severity of PAH and degree of lung function ($p<0.05$), thereby with decrease in lung function in COPD patients there was a significant increase in pulmonary arterial pressure.(Table 6)

DISCUSSION

A hospital based prospective, observational, cross sectional study was conducted with 100 patients to analyse the prevalence of pulmonary arterial hypertension (PAH) in chronic obstructive pulmonary disease (COPD) patients and to correlate the changes in echocardiography with severity of airway obstruction in these COPD patients.

In the present study, majority of the patients (45%) were in the age group of 56-65 years followed by 28% in the age group of 46-55 years, 21% in the age group of 36-45 years, 4% in the age group of 26-35 years and 2% in the age group of 18-25 years. The mean age of the patients was 51.83 ± 10.14 years. There was a male preponderance (63%) in our study while female patients constituted 37% of the study group.

Reddy S et al⁶, in a retrospective observational hospital-based study assessing the prevalence of pulmonary hypertension in COPD patients and highlighting the importance of early diagnosis found that, age of the patients ranged between 39 years to 84 years. The age in mild COPD group ranged from 39 years to 80 years with a mean age of 66 ± 11.29 years. The age in moderate COPD group was between 50 years to 84 years with a mean of 65.60 ± 9.90 years and in severe COPD group was 40 years to 78 years with a mean of 57.80 ± 9.08 years. In this study out of 122 patients, 104 (85.25%) were males and 18 (14.25%) were females.

CONCLUSION-

In our study, 63 (63%) patients had pulmonary arterial hypertension (PAH).. Of these 63 patients, 38 (60%) had mild degree of PAH, 10 (16%) had moderate degree of PAH and the remaining 15 (24%) had severe degree of PAH. The study showed a statistically significant inverse relationship between the severity of PAH and deterioration in lung function ($p<0.05$), thereby with decrease in lung function in COPD patients there was a significant increase in pulmonary arterial pressure.

REFERENCES-

1. World Health Organization. Burden of COPD. Available from: <http://www.who.int/respiratory/copd/burden/en/> Assessed on 2013 June 05.
2. World Health Organization. Chronic obstructive pulmonary disease (COPD) Fact sheet No 315. World Health Organization. 2011 Nov. Available from: <http://www.who.int/mediacentre/factsheets/fs315/en/index.html>. Assessed on 2013 June 05.
3. Lopez AD, Shibuya K, Rao C, et al. Chronic obstructive pulmonary disease: current burden and future projections. *Eur Respir J*. 2006; 27: 397-412.
4. Sin DD, Anthonisen NR, Soriano JB, et al. Mortality in COPD: Role of comorbidities. *Eur Respir J* 2006; 28: 1245-1257.
5. Sakao S, Voelkel NF, Tatsumi K. The vascular bed in COPD: pulmonary hypertension and pulmonary vascular alterations. *Eur Respir Rev* 2014; 23: 350-355.
6. Reddy S, Reddy RN. Prevalence of Pulmonary Hypertension in COPD Patients: A Retrospective Observational Study. *Int J Intg Med Sci* 2016; 3: 285-289.