

# Prevalence of Pulmonary Hypertension in COPD Patients

Vikash Kumar<sup>1</sup>, Anjali P. Ghare<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Chest and TB, Narayan Medical College and Hospital, Jamuhar, Bihar.

<sup>2</sup>Professor and HOD, Department of Chest and TB, Narayan Medical College and Hospital, Jamuhar, Bihar.

## ABSTRACT

### BACKGROUND

Chronic obstructive pulmonary disease cases are increasing, and are a major cause of death worldwide. Pulmonary hypertension is one of its complication, which is defined as mean pulmonary artery pressure above 25 mmHg at rest, which can be assessed by right heart catheterization. Pulmonary hypertension developing in setting of chronic obstructive pulmonary disease is one of the most common causes of pulmonary hypertension. PH in chronic obstructive pulmonary disease can lead to increased mortality, irrespective of FEV1 level of chronic obstructive pulmonary disease patients. Pulmonary hypertension in COPD can lead to increased acute exacerbation, low quality of life of in chronic obstructive pulmonary disease patients.

### METHODS

Patients having clinical signs and symptoms suggestive of chronic obstructive pulmonary disease visiting NMCH, Jamuhar were enrolled in our study. Spirometry was done in each patient for diagnosis of COPD. In this study, the post bronchodilator FEV1/FVC<0.07 along with clinical symptoms were required to confirm the diagnosis chronic obstructive pulmonary disease. After diagnosis of chronic obstructive pulmonary disease, each patient was asked to get 2-D Echo done. Diagnosis of pulmonary hypertension was done from 2-D ECHO report only.

### RESULTS

Total 104 patients enrolled in our study out of which 11 patients could not complete the study thus they were excluded from study. Remaining 93 patients completed the study. Out of 93 patients (M-61 & F-32) who completed study, 27 patients (M-16 & F-11) were diagnosed having pulmonary hypertension by echocardiography.

### CONCLUSIONS

Prevalence of pulmonary hypertension in chronic obstructive pulmonary disease in our study came out to be 29.03%, (in male 26.22% and in female 34.37%). There is no relation between severity of pulmonary hypertension and FEV1 value of chronic obstructive pulmonary disease.

### KEYWORDS

Pulmonary Hypertension, COPD, Echocardiography, MPAP, FEV1- Forced Expiratory Volume in One Second, FVC- Forced Vital Capacity, COPD- Chronic Obstructive Pulmonary Disease, MPAP- Mean Pulmonary Artery Pressure, PH- Pulmonary Hypertension

*Corresponding Author:*

*Dr. Vikash Kumar,  
Assistant Professor,  
D- Block, Room No. 12,  
Narayan Medical College and Hospital,  
Jamuhar, Bihar.  
E-mail: vpkumarsingh@gmail.com  
DOI: 10.18410/jebmh/2019/569*

*Financial or Other Competing Interests:  
None.*

*How to Cite This Article:*

*Kumar V, Ghare AP. Prevalence of  
pulmonary hypertension in COPD  
patients. J. Evid. Based Med. Healthc.  
2019; 6(42), 2742-2745. DOI:  
10.18410/jebmh/2019/569*

*Submission 24-09-2019,  
Peer Review 28-09-2019,  
Acceptance 12-10-2019,  
Published 16-10-2019.*



## BACKGROUND

Chronic Obstructive Pulmonary Disease (COPD), is a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases (GOLD update 2014).

Chronic obstructive pulmonary disease cases are increasing, and it is one of major cause of death worldwide.<sup>1</sup> It leads to economic, mental, physical and social burden to patients of COPD, community and health care system. Exacerbations and comorbidities of COPD leads to the increased severity in patients of chronic obstructive pulmonary disease. Chronic obstructive pulmonary disease patients visit to health care system due to progressive breathlessness and cough which keeps on going for long time. As disease itself is of progressive nature it leads to certain complication along its natural history of progression.

Pulmonary hypertension is one of its complication, which is defined as mean pulmonary artery pressure above 25 mmHg at rest, which can be assessed by right heart catheterization.<sup>2</sup> Normal pulmonary artery pressure is 15-17 mmHg. Pulmonary hypertension can be a severe disease with a markedly decreased exercise tolerance and heart failure. The prevalence in men is about 13.4 percent above age 34, and increases to around 28.2 percent above age 64. Due to the high prevalence of Chronic Obstructive Pulmonary Disease, Pulmonary hypertension developing in setting of Chronic Obstructive Pulmonary Disease is one of the common causes of pulmonary hypertension.<sup>3</sup> Pulmonary hypertension in Chronic Obstructive Pulmonary Disease can lead to increased mortality in patients of Chronic Obstructive Pulmonary Disease,<sup>4</sup> irrespective of its FEV1 level.<sup>5-6</sup> Pulmonary hypertension in Chronic Obstructive Pulmonary Disease can lead to increased acute exacerbation<sup>3</sup> of Chronic Obstructive Pulmonary Disease, and can lead to low quality of life in patients of Chronic Obstructive Pulmonary Disease.<sup>7</sup> Hence it is very much important to have the prevalence of pulmonary hypertension in chronic obstructive pulmonary disease cases in our setting. Normally Pulmonary hypertension in patients with Chronic Obstructive Pulmonary Disease is having mild to moderate, mean pulmonary artery pressure values (20-35) mmHg<sup>5</sup> but in some individual patients can have mean pulmonary artery pressure values very high.<sup>8</sup> Different studies have shown prevalence of pulmonary hypertension in Chronic Obstructive Pulmonary Disease from 18%<sup>9</sup> to up to 91%.<sup>7</sup>

From above background it is very much clear that COPD patients can have pulmonary hypertension as its own complication, which in itself can complicate natural history of COPD patients. Hence in every patients of COPD, we must look for development of pulmonary hypertension. If we can diagnose at earliest pulmonary hypertension in COPD patients, then their quality of life can be improved by managing it properly.

We wanted to determine the prevalence of PH in COPD patients and evaluate the relation between severity of PH and FEV1 value of COPD patients.

## METHODS

Patients having clinical sign and symptoms suggestive of COPD, aged between 40 years and 80 years visiting NMCH, Jamuhar between November 2018 to August 2019 were enrolled in our study. Patients with HIV, CLD (ILD, asthma, OSA), cardiac diseases and with past history of pulmonary TB were excluded from the study.

A written informed consent was taken from everyone. A detailed clinical history was taken (Symptoms of PH may include dyspnoea, fatigue, syncope, oedema, dizziness, chest pain) and bed side examination was done (Sign of PH -right ventricular heave, jugular venous distention, peripheral oedema, hepatomegaly, ascites) in each patient. Past history for anti-tuberculosis therapy was inquired in every Patient. All patients got done acid-fast bacillus (AFB) testing of sputum and chest radiography (X-ray in PH shows-cardiac enlargement, prominent proximal pulmonary artery, pruning of distal pulmonary artery, no evidence of pulmonary oedema, sign of left-sided disease, lungs look normal) done too. Spirometry was done in each patient for diagnosis of COPD. In our study the post bronchodilator FEV1/FVC<0.07 along with clinical symptoms was required to confirms the diagnosis COPD. After diagnosis of COPD each patient enrolled in study were asked to get 2-D ECHO done. Diagnosis of pulmonary hypertension was done from 2-D ECHO (ECHO in PH shows-increased sPAP or tricuspid regurgitation jet velocity, right atrial and ventricular hypertrophy, flattening of septum and dilated pulmonary artery) report only.

PH was defined in our study by having a systolic pulmonary arterial pressure (sPAP) greater than 35 mmHg on 2-D ECHO as taken in different studies.<sup>10,11</sup>

## RESULTS

As mentioned above the very same study protocol was strictly followed for each individuals of COPD patients enrolled in our study. Data was collected during entire period dedicated to this study. At the completion of study data was analysed as discussed below.

Total 104 patients enrolled in our study out of which 11 patients could not complete the study thus they were excluded from study. Remaining 93 patients completed the study. 93 patients (M-61 & F-32) who completed study, 27 patients (M-16 & F-11) were diagnosed with pulmonary hypertension by echocardiography. So overall prevalence of pulmonary Hypertension in chronic obstructive pulmonary disease in our study came out to be 29.03%, whereas in male 26.22% and in female 34.37%.

Mean age of patients of COPD with PH was 64.60 year and mean age of patients of COPD without PH was 63.01 year. In patients of COPD with PH 62.96% was having resting hypoxemia while 18.80% patients of COPD without PH were having resting hypoxemia. Mean FEV1 of patients of COPD with PH was 49.02% and mean FEV1 of patients of COPD without PH was 42.06%. Mean Systolic PAP of patients of COPD with PH was 41.4 mmHg and mean Systolic PAP of patients of COPD without PH was 24.08 mmHg. Out of 93 patients 3 patients belong to GOLD class I, 32 patients belong to GOLD class II, 26 patients belong to GOLD class III and 32 patients belong to GOLD class IV.

Out of 3 patients who belong to GOLD class I no one had PH, Out of 32 patients who belong to GOLD class II five patients had PH, Out of 26 patients who belong to GOLD class III nine patients had PH and Out of 32 patients who belong to GOLD class IV thirteen patients had PH.

Parameters	COPD with PH (27)	COPD without PH (66)
Age (year, mean)	64.60	63.01
Sex (M/F)	16 / 11	45/ 21
Resting Hypoxemia (%)	62.96%	18.80%
FEV1 (% of predicted value mean)	49.02	42.06
GOLD I / II / III / IV (number of patients)	0 / 5 / 9 / 13	3/ 27 / 17 / 19
Systolic PAP (mmHg, mean)	41.4	24.08

**Table 1. M-Male, F-Female, %-Percentage**

### DISCUSSION

Chronic obstructive pulmonary disease is characterized by persistent airflow limitation that is associated with chronic inflammatory response in airways and lung. It is associated with changes in small airways, parenchyma and pulmonary vasculature. Small Airways changes leads to bronchiolitis. Lung parenchyma changes leads to emphysema. Pulmonary vasculature changes lead to pulmonary hypertension. Standard for diagnosis of COPD is Spirometry.

Presence of pulmonary Hypertension in chronic obstructive pulmonary disease is associated with high mortality in chronic obstructive pulmonary disease patients. Pulmonary Hypertension is a limiting factor of the performance in exercise tests such as the 6MWT & cardiopulmonary exercise test

Classical teaching says that pulmonary Hypertension in chronic obstructive pulmonary disease develop due to destruction of the vascular bed and hypoxemia induced pulmonary vasoconstriction. But now it is clear that many factors are involved in development of PH in chronic obstructive pulmonary disease like- endothelial dysfunction, inflammatory infiltration of the vessel, pulmonary vascular remodelling, chronic inflammation and changes to the lung extracellular matrix, pulmonary artery smooth muscle cell senescence caused by telomere shortening and genetic predisposition. Pathology of PH include-medial hypertrophy, intimal fibrosis, plexiform lesions, venous muscularization, organized thrombi and vascular destruction. Only on basis of clinical symptoms and signs it is difficult to diagnose pulmonary Hypertension in chronic obstructive pulmonary

disease patients who do not have sign of right heart failure,<sup>12</sup> so we require an objective test like echocardiography to diagnose PH, as right heart catheterization is invasive method. But presence of hypoxemia should warrant next investigation in every case.<sup>13</sup> Pulmonary Hypertension was defined in our study by having a systolic pulmonary arterial pressure (sPAP) greater than 35 mmHg by 2-D ECHO. Prevalence of pulmonary Hypertension in chronic obstructive pulmonary disease in our study came out to be 29.03%, whereas in male 26.22% and in female 34.37%. There is no relation between severity of pulmonary Hypertension and FEV1 value of chronic obstructive pulmonary disease which is similar to finding of other studies (<sup>10</sup>) our study have certain limitations. First, this is a medical college-based study and so there can be referral bias involved in patient selection. Second, the patient's number was small. Third, exclusion criteria were applied to enrol patients in our study, which may not be always similar.

### CONCLUSIONS

Prevalence of Pulmonary Hypertension in Chronic Obstructive Pulmonary Disease in our study came out to be 29.03%, in males it was 26.22% and in female 34.37%. There is no relation between severity of pulmonary Hypertension and FEV1 value of chronic obstructive pulmonary disease. As pulmonary Hypertension carries poor prognosis in chronic obstructive pulmonary disease, it must be evaluated each patient of chronic obstructive pulmonary disease.

### REFERENCES

- [1] Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. Global Initiative for Chronic Obstructive Lung Disease. Available from [http://www. Goldcopd.org](http://www.Goldcopd.org). Updated: 2011. Date last accessed: Dec. 15, 2012.
- [2] Simonneau G, Robbins IM, Beghetti M, et al. Updated clinical classification of pulmonary hypertension. J Am Coll Cardiol 2009;54(1 Suppl):S43-S54.
- [3] Kessler R, Faller M, Fourgaut G, et al. Predictive factors of hospitalization for acute exacerbation in a series of 64 patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med 1999;159(1):158-164.
- [4] Andersen KH, Iversen M, Kjaergaard J, et al. Prevalence, predictors and survival in pulmonary hypertension related to end-stage chronic obstructive pulmonary disease. J Heart Lung Transplant 2012;31(4):373-380.
- [5] Weitzenblum E, Chaouat A, Canuet M, et al. Pulmonary hypertension in chronic obstructive pulmonary disease and interstitial lung diseases. Semin Respir Crit Care Med 2009;30(4):458-470.
- [6] Stone AC, Machan JT, Mazer J, et al. Echocardiographic evidence of pulmonary hypertension is associated with

- increased 1-year mortality in patients admitted with chronic obstructive pulmonary disease. *Lung* 2011;189(3):207-212.
- [7] Scharf SM, Iqbal M, Keller C, et al. Hemodynamic characterization of patients with severe emphysema. *Am J Respir Crit Care Med* 2002;166(3):314-322.
- [8] Chaouat A, Minai OA. Pulmonary hypertension in patients with COPD. In: Hoeper M, Humbert M, eds. *Pulmonary hypertension*. Eur Respir Soc Monograph 2012:138-147.
- [9] Arcasoy SM, Christie JD, Ferrari VA, et al. Echocardiographic assessment of pulmonary hypertension in patients with advanced lung disease. *Am J Respir Crit Care Med* 2003;167(5):735-740.
- [10] Sertogullarindan B, Gumrukcuoglu HA, Sezgi C, et al. Frequency of pulmonary hypertension in patients with COPD due to biomass smoke and tobacco smoke. *Int J Med Sci* 2012;9(6):406-412.
- [11] Clini E, Cremona G, Campana M, et al. Production of endogenous nitric oxide in chronic obstructive pulmonary disease and patients with cor pulmonale. Correlates with echo-Doppler assessment. *Am J Respir Crit Care Med* 2000;162(2 Pt 1):446-450.
- [12] Jyothula S, Safdar Z. Update on pulmonary hypertension complicating chronic obstructive pulmonary disease. *Int J COPD* 2009;4:351-363.
- [13] Barberà JA, Blanco I. Pulmonary hypertension in patients with chronic obstructive pulmonary disease: advances in pathophysiology and management. *Drugs* 2009;69(9):1153-1171.