



## Echocardiographical Evaluation And Cardiovascular Changes In Chronic Obstructive Pulmonary Disease Patients In Tertiary Care Hospital

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### ABSTRACT

**INTRODUCTION:** Chronic obstructive pulmonary disease (COPD) is a disease characterized by progressive poorly reversible airway destruction. Cardiovascular disease accounts for significant morbidity and mortality in chronic obstructive pulmonary disease (COPD). Its prevalence and mechanisms of association have not been elucidated. The study aimed to assess the prevalence of echocardiographic abnormalities and potential risk factors in patients with COPD.

**MATERIALS AND METHODS:** A total of 86 COPD patients were enrolled in the present study. All patients were subjected to full medical history and clinical examination, chest radiography, complete blood count, lipid profile, spirometry, 2D-echocardiography.

**RESULTS:** 86 patients included in our study. Out of 86 patients, 74 (86%) were male and 12 (14%) were females. Male to female ratio was 6.1:1. Mean age was 58.2 ± 12.7 years. Severity of COPD patients classify according to GOLD criteria. Out of 86 patients, 15 patients had FEV1 < 80% of predicted, 10% patients had mod. (FEV1 50-80%), 24 had severe and 37 had very severe disease. Pulmonary artery hypertension was defined as SPAP > 30 mmHg which was seen in 40 cases (46.5%). Out of 50 patients, 15 (17.4%) patients had mild, 5 (10.5%) had moderate and 18 (18.6%) had severe pulmonary hypertension, 12 (13.6%) patients had right ventricular systolic dysfunction, 11 (12.8%) had left ventricular systolic dysfunction and left ventricular hypertrophy. 16 (18.6%) had cor pulmonale.

**CONCLUSION:** Echocardiography is helpful in early detection of cardiac complication in COPD patients.

**KEY WORDS:** Chronic obstructive pulmonary disease, pulmonary hypertension, cor pulmonale, left ventricular hypertrophy.

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a complex and heterogeneous clinical syndrome found in 6- 8% of entire population <sup>1</sup>. It is a major cause of morbidity and 4<sup>th</sup> leading cause of death in the world<sup>2</sup> and further increases in prevalence and mortality can be predicted in the coming decades.

COPD is associated with significant extra pulmonary (systemic effects) among which cardiac manifestations are most common. Cardiovascular diseases account for approximately 50% of all hospitalizations and nearly one-third of all deaths, if forced expiratory volume in one second (PEF<sub>1</sub>) > 50% of predicted <sup>3</sup>.

COPD affects pulmonary blood vessels,, right ventricle as well as left ventricle leading to development of PHT, cor pulmonale, right ventricular dysfunction and left ventricular dysfunction.

There was less data in this segment of correlation of cardiopulmonary diseases, so this study was planned to confirm various cardiovascular manifestations in COPD patients and to find out correlation of cardiovascular complications with its severity.

## Material And Methods

86 COPD patients were included in this study who were confirmed by clinical history, radiology of chest and pulmonary function test selected from Pulmonary Medicine Department SRMS-IMS, Bareilly from Jan- 2014 to Jan- 2016

ECG and Echocardiography was also done

All the patients were investigated by spirometry and diagnosed and classified according to GOLD guidelines 2010<sup>4</sup>.

All patients having known respiratory diseases like old treated Pulmonary Tuberculosis, Bronchial Asthma; as well as diabetes, Systemic Hypertension, Rheumatic fever, Congenital Ischemic Heart diseases were excluded.

All patients were undertaken for 2D echocardiography as per recommendation of American Society of Echocardiography<sup>5,6</sup>.

## RESULT

86 patients included in our study. Out of 86 patients, 74( 86%) were male and 12( 14%) were females. Male to female ratio was 6.1:1. Mean age was  $58.2 \pm 12.7$  years.

**Table-1:** Sex Distribution Of COPD Patients

SEX	N	%
Male	74	86%
Female	12	14%

Severity of COPD patients classify according to GOLD criteria. Out of 86 patients, 15 patients had FEV<sub>1</sub>< 80% of predicted, 10% patients had mod.(FEV<sub>1</sub> 50-80 %), 24 had severe and 37 had very severe disease.

**Table-2:** Patients classification according to severity of COPD

Severity of COPD	N	%
Mild- FEV <sub>1</sub> <80% predicted	15	17.4%
Moderate 50-80% predicted	10	11.5%
Severe 30-50% predicted	24	27.9%
Very severe <30% predicted	37	43.2%

FEV<sub>1</sub> : Forced expiratory volume in one second

On echocardiography, 10 patients had normal study. Measurable tricuspid regurgitation was observed in 42 patients,.

Pulmonary artery hypertension was defined as SPAP> 30 mmHg which was seen in 40 cases ( 46.5%) . Out of 50 patients, 15 (17.4%) patients had mild, 5 (10.5%) had moderate and 18 (18.6%) had severe pulmonary hypertension.

In our study, 12 ( 13.6%) patients had right ventricular systolic dysfunction, 11 (12.8%) had left ventricular systolic dysfunction and left ventricular hypertrophy. 16 ( 18.6%) had cor pulmonale.

It has been seen that the severity of cardiac manifestations increases as the severity of COPD increases.

**Table-3:** Echocardiography finding in COPD patients.

	N	%
Normal	10	11.6
Pulmonary hypertension (SPAP>30mmHg)\		
Mild 30-50	13	17.4
Moderate 50-70	09	10.5
Severe >70	16	18.6
RVSD	12	13.6
LVH	11	12.8
LVDD	30	34.9
LVSD	11	12.8
Cor pulmonale	10	11.6

RVSD: Right ventricular systolic diameter

LVH: Left ventricular hypertrophy

LVDD: Left ventricular diastolic dysfunction

LVSD: Left ventricular systolic diameter

## DISCUSSION

COPD is the most common medical problem in rural population, according to a hospital based evaluation and has significant mortality and morbidity. The cardiac complications are numerous. Significant structural changes occur in the pulmonary circulation in patients with COPD.

The present study included 86 patients; out of this, 74 patients were male and 12 were females. The male to female ratio was 6.1:1. The incidence of smoking was more in males as compared to females. In the present study, 40 (46.5%) had pulmonary hypertension. Pulmonary hypertension is a common complication seen in patients with advanced chronic obstructive pulmonary disease (COPD). It has clear effects on both morbidity and mortality<sup>7</sup>. Although the true prevalence of PH in COPD is unknown, an elevation of pulmonary arterial pressure is reported to occur in 20–90% of patients when measured by right heart catheterization with some evidence that pulmonary hemodynamics worsen with worsening airflow obstruction<sup>8,9,10,11,12,13</sup>.

Cor pulmonale is present in 11.6 % of patients in our study. Approximately 25 % patients with COPD eventually develop cor pulmonale. Cor pulmonale was found in 40% patients with COPD in one autopsy study<sup>14,15</sup>.

Some study indicate that LV function remains normal in persons with COPD, whereas others suggest that LV dysfunction may be present<sup>16,17</sup>.

In our study, left ventricular dysfunction (LVSD) is present in 12.8% patients, in previous studies it was present in 4%- 32% patients of COPD<sup>18-21</sup>.

In our study LVDD was present in 34.9% of patients, left ventricular hypertrophy (LVH) was present in 12.8 % patients in our study, in previous study LVH was found in 25%-60% patients<sup>22</sup>.

## CONCLUSION

To conclude, high prevalence of pulmonary hypertension, cor pulmonale, left ventricular dysfunction complicating COPD, more so with more severe COPD. The screening must to be done in all COPD patients to rule out cardiac complications. This would contribute to the assessment of prognosis in these patients and assist in identifying individuals likely to suffer increased mortality and morbidity warranting close monitoring and intense treatment.

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