Original Article

The Prognosis of Pulmonary Hypertension (PH) and its Association with COPD

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Abstract

Background: *COPD has a high rate of cardiovascular illness. The most common cardiovascular consequence in COPD is both systemic and pulmonary hypertension (PH).*

Objective: *In this study our main goal is to evaluate the prognosis of pulmonary hypertension (PH) and its association with COPD.*

Method: *This observational study was carried out at tertiary medical hospital from February 2021 to February 2022. Where a total of 100 patients diagnosed with COPD on the basis of spirometry were evaluated with two-dimensional (2D) echocardiography to screen for echocardiographic signs and evidence of PH and severity staging of PH if present.*

Results: *During the study, majority was belonging to >60 years age group, 65% and majority were male. According to clinical symptom, 80% had cough followed by 60% had Expectoration, 5% had Haemoptysis, 90% had Breathlessness, 30% had fever, 35% had weakness an fatigue, 45% had chest pain, 15% had weight loss and appetite loss. 25% had normal radiological findings, 50% had emphysema, 15% had pulmonary hypertension (PH), 11% had bronchitis in addition, 30% had mild PH followed by 5% had moderate and 3% had severe level of PH. There was a significant difference between the four GOLD stages in terms of distribution of severity of PH and was statistically significant ($\chi 2 = 36.195$, $p = <0.001$). Participants in the GOLD Stage 1 had the largest proportion of normal 2D echocardiography studies. Participants in the GOLD Stage 4 had the largest proportion of mild to severe PH.*

Conclusion: *From our study we can conclude that, as the COPD severity increased, the frequency and degree of PH were also found to be increased, and this difference was found to be statistically significant. Also, it was a notable finding in our study that patients with greater severity of airflow obstruction graded by GOLD staging were also found to have higher systolic Pulmonary artery pressure (PAP) on echocardiography.*

Keywords: *Pulmonary hypertension (PH), chronic obstructive pulmonary disease (COPD), cardiovascular illness*

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Introduction

Systemic hypertension, ischemic heart disease, Type 2 diabetes mellitus, respiratory infections, nutritional deficiencies, PH, cor pulmonale, pulmonary thromboembolism, depression, and anemia are the most prevalent comorbidities associated with chronic obstructive pulmonary disease (COPD). COPD has a high rate of cardiovascular illness. The most common cardiovascular consequence in COPD is both systemic and pulmonary hypertension (PH). COPD-associated PH is commonly acknowledged to play a role in the development of clinical symptoms, morbidity, and mortality. The presence of PH has a significant impact on the disease's natural history, resulting in frequent exacerbations, fast loss in pulmonary functions, chronic hypoxemia, and early morbidity and death[1-4].

Chronic PH, which is commonly undiagnosed, finally causes right ventricular (RV) hypertrophy, dilatation, and subsequent RV failure. The relevance of pulmonary arterial pressures in the prognosis of COPD cannot be overstated. In a meta-analysis of prognostic markers, pulmonary arterial pressures more than 20 mm Hg were found to strongly predict death at five years. Furthermore, in COPD patients who were administered long-term oxygen supplementation, the magnitude of pulmonary artery pressures was found to be more important than pulmonary function test (PFT) or arterial blood gas (ABG) abnormalities[5-8].

In this study our main goal is to evaluate the prognosis of pulmonary hypertension and its association with COPD.

Objective: To evaluate the prognosis of pulmonary hypertension and its association with COPD.

Methodology

This observational study was carried out at tertiary medical hospital from February 2021 to February 2022. Where a total of 100 patients diagnosed with COPD on the basis of spirometry were evaluated with two-dimensional (2D) echocardiography to screen for echocardiographic signs and evidence of PH and severity staging of PH if present.

All collected data were coding and input in SPSS-25 for further analysis. Both descriptive and inferential statistics done. Descriptive statistics included frequency distribution, percent, mean, standard deviation; graph, tables, figures and inferential statistics.

Results

In table-1 shows age distribution of the study group where majority were belonging to >60 years age group, 65%. Followed by 25% belong to 41-50 years group and 10% belong to 31-40 years age group. The following table is given below in detail:

Table-1: Age distribution of the patients

Age group	%
31-40 years	10%
41-50	25%
>60 years	65%

In figure-1 shows gender distribution of the study group where majority were male, 69.44%. The following figure is given below in detail:

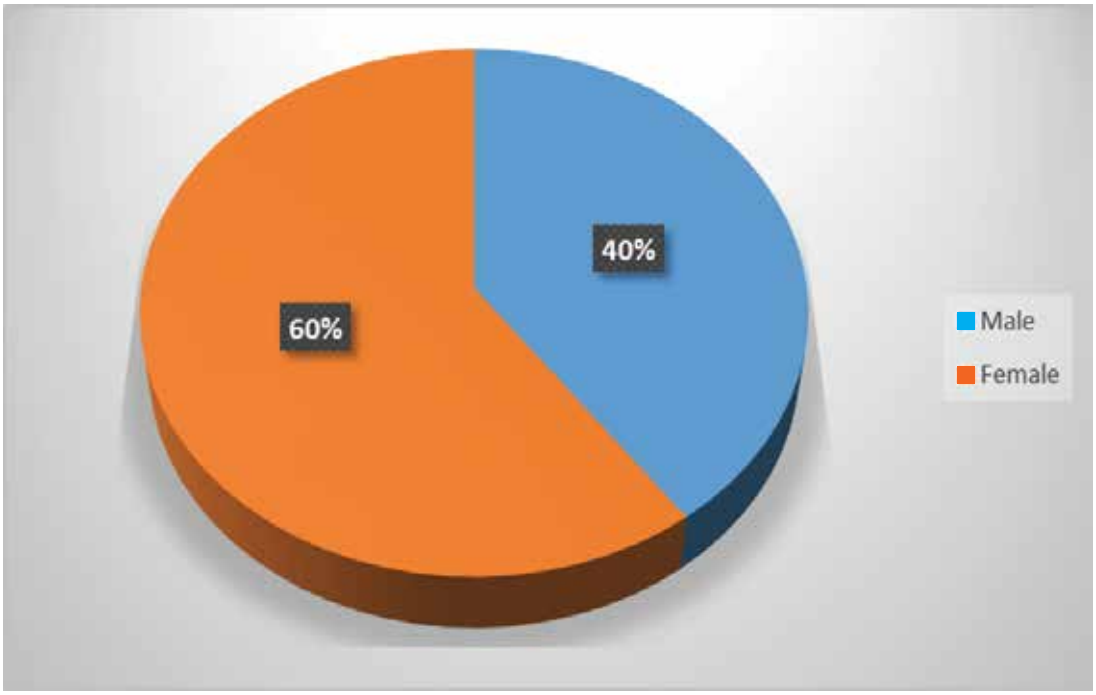

Figure 1: Gender distribution of the patients.

Table-2: Clinical symptoms

Clinical symptoms	**%**
Cough	81%
Expectoration	60%
Haemoptysis	5%
Breathlessness	90%
Fever	30%
Weakness and Fatigue	35%
Chest pain	45%
Weight And Appetite loss	15%

In table-2 shows clinical symptoms of the patients where 80% had cough followed by 60% had Expectoration, 5% had Haemoptysis, 90% had Breathlessness, 30% had fever, 35% had weakness and fatigue, 45% had chest pain, 15% had weight loss and appetite loss. The following table is given below in detail:

In figure-2 shows sign of the study group where 70% had tachycardia, 69% had tachypnea, 35% had pallor. The following figure is given below in detail:

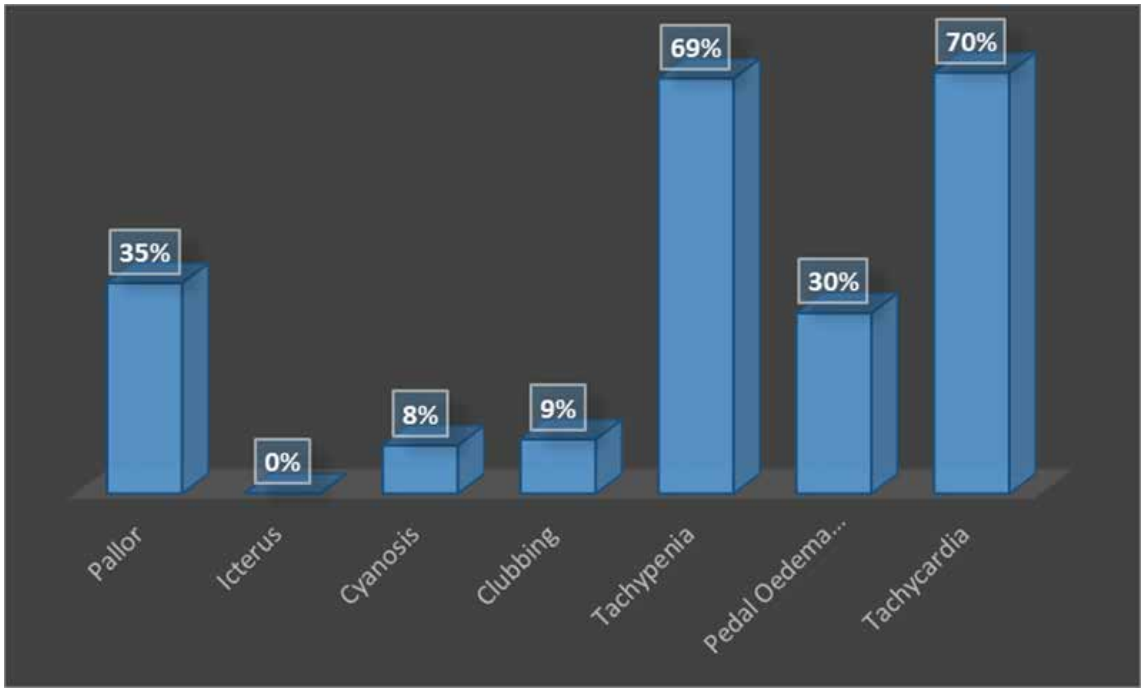

Figure-2 sign of the study group.

Table-3: Radiological findings

Radiological findings	Percent
Normal radiological findings	25%
Emphysema	50%
Cavity	5%
Pleural effusion	8%
Pulmonary artery thrombosis (On CT Thorax)	2%
Pulmonary hypertension (On CT Thorax)	15%
Bronchiectasis	11%

In table-3 shows radiological findings of the study participants 25% had normal radiological findings, 50% had emphysema, 15% had pulmonary hypertension (PH), 11% had bronchiectasis. The following table is given below in detail:

In figure-3 shows PH severity by two-dimensional echocardiography 30% had mild PH followed by 5% had moderate and 3% had severe level of PH. The following figure is given below in detail:

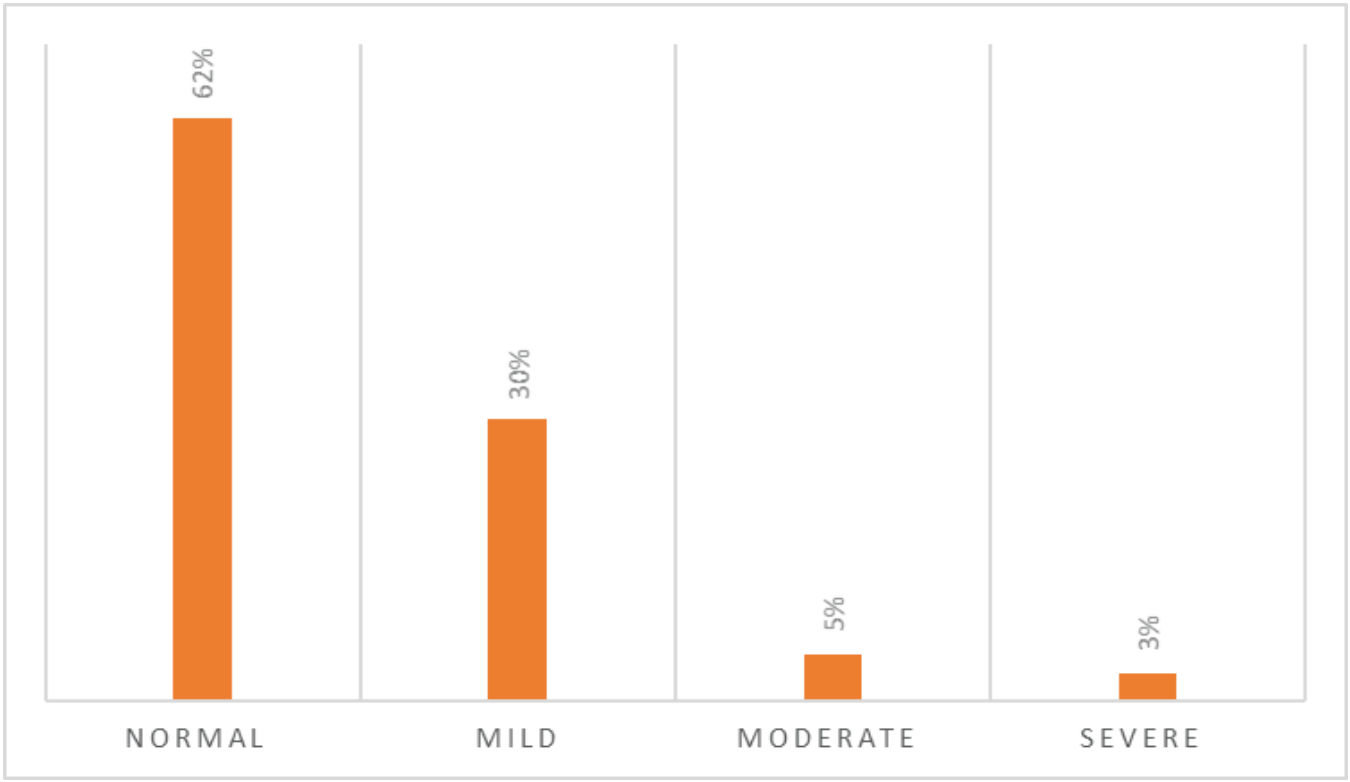

Figure-3: PH severity.

Table-4: Association between GOLD staging and the severity of PH on echocardiography

	GOLD , stage -1	GOLD, stage - 2	GOLD, stage - 3	GOLD, stage - 4	P value
Normal	23%	20%	15%	4%	<0.001
Mild			20%	10%	
Moderate			2%	3%	
Severe			1%	2%	

In table-4 shows Association between GOLD staging and the severity of PH on echocardiography where there was a significant difference between the four GOLD stages in terms of distribution of severity of PH and was statistically significant ($\chi 2 = 36.195$, $p = <0.001$). Participants in the GOLD Stage 1 had the largest proportion of normal 2D echocardiography studies. Participants in the GOLD Stage 4 had the largest proportion of mild to severe PH. The following table is given below in detail:

Discussion

According to one finding, 38% of COPD patients had PH, which is strikingly similar to the incidence of PH in earlier studies as shown below[9,10] which was supported by our study, where 38% had COPD.

In our study, out of the 50 PH patients mild, moderate, and severe PH was seen in 26 patients (65%), nine patients (22.5%), and five patients (12.5%), respectively. The frequency of PH in moderate and severe COPD was 25% and 51.5% respectively. As the COPD severity increased, prevalence and severity of PH were also found to be increased in the study and it was also observed that severe PH was present mostly in patients with severe COPD[11], which was similar to our study where 30% had mild PH followed by 5% had moderate and 3% had severe level of PH.

In a recent Indian study on 40 COPD patients, PH was found in 42.5% of cases with mild, moderate, and severe PH with prevalence rates of 25%, 10%, and 7.5%, respectively[12.]. Our findings were comparable to this study. They concluded that prevalence and severity of PH increase with the severity of COPD. Similar conclusions were made by other two studies, where the severity of PH tends to correlate with the degree of airflow obstruction[13,14].

Conclusions

From our study we can conclude that, as the COPD severity increased, the frequency and degree of PH were also found to be increased, and this difference was found to be statistically significant. Also, it was a notable finding in our study that patients with greater severity of airflow obstruction graded by GOLD staging were also found to have higher systolic PAP on echocardiography.

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