

ASSESSMENT OF COPD SEVERITY AND RIGHT HEART STATUS AMONG PATIENTS ATTENDING A TERTIARY CARE HOSPITAL

Ankita Verma¹¹Assistant Professor, Department of TB and Chest, ASMC, Shahjahanpur, Uttar Pradesh, India

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Corresponding Author:
Dr. Ankita verma,
 Email: dr.anky185@gmail.com

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Abstract

Background: To assess COPD severity and right heart status among patients attending a tertiary care hospital. **Materials and Methods:** Ninety- six COPD patients aged >40 years of either genders were selected. Right ventricular hypertrophy and RV dilatation was recorded. Gold COPD staging was adopted. **Result:** Out of 96 patients, males were 50 (52.1%) and females were 46 (47.9%). Cases were mild in 5, moderate in 44, severe in 40 and very severe in 7 cases. The difference was significant ($P < 0.05$). RV hypertrophy was seen in 4 patients with mild, 42 patients with moderate, 38 patients with severe and 12 patients with very severe COPD. The difference was non-significant ($P > 0.05$). RV dilatation was seen in 6 patients with mild, 40 patients with moderate, 36 patients with severe and 14 patients with very severe COPD. The difference was non-significant ($P > 0.05$). **Conclusion:** The most common echo finding was RV hypertrophy. Routine echocardiography should be performed in patients with COPD for early detection of right heart changes like pulmonary hypertension, RV hypertrophy and dilatation, RA dilation, diastolic dysfunction in order to initiate treatment and to reduce the morbidity and mortality.

INTRODUCTION

Acute exacerbations of chronic obstructive pulmonary disease (COPD) are defined as a worsening of COPD symptoms caused by a rapid deterioration of the underlying respiratory function.^[1] Moderate to severe exacerbations represent a major cause of hospital admissions. Indications for hospitalization are the inadequate response to outpatient management, the inability to perform activities of daily living owing to increased dyspnea, the development of respiratory failure, the association of comorbidities, or inadequate home care resources.^[2]

COPD is associated with several systemic manifestations that result in impaired functional capacity, worsening dyspnoea, reduced health-related quality of life and increased mortality.^[3] Complications include the presence of concomitant cardiovascular compromise, malnutrition involving primarily the loss and dysfunction of skeletal muscles, osteoporosis, anemia, increased gastro esophageal reflux and clinical depression and anxiety.^[4] Owing to the usual age of presentation of COPD, it is usually associated with other comorbidities which increases the risk of hospitalization and mortality among them, especially as the airway obstruction becomes more severe.^[5]

Pulmonary hypertension (PH) associated with COPD is one of the most common causes of PH because of the high prevalence of COPD.^[6] PH is a known predictor of mortality in COPD patients, irrespective of the severity of pulmonary obstruction and potential cases of acute exacerbation. The estimated prevalence of COPD according to various studies of range from 18% to up to 91%.^[7] We performed this study to assess COPD severity and right heart status among patients attending a tertiary care hospital.

MATERIALS AND METHODS

After considering the utility of the study and obtaining approval from ethical review committee, we selected ninety- six COPD patients aged >40 years of either genders. Patients' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Pulmonary hypertension was defined as an increase in mean pulmonary artery (mPA) ≥ 25 mm Hg at rest, as assessed by right heart catheterization. The normal mPA is 14 ± 3 mm Hg with an upper limit of normal of approximately 20 mm Hg. Cor pulmonale: Right ventricular hypertrophy, dilation, or both as a result of pulmonary hypertension caused by pulmonary disorders involving the lung parenchyma, impaired pulmonary bellows function,

or altered ventilatory drive. Gold COPD staging was adopted. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Out of 96 patients, males were 50 (52.1%) and females were 46 (47.9%) [Table 1].

Table 1: Patients distribution

Total- 96		
Gender	Males	Females
Number (%)	50 (52.1%)	46 (47.9%)

Table 2: Assessment of COPD severity

Gold staging	Number	P value
Mild	5	0.05
Moderate	44	
Severe	40	
Very severe	7	

Table 3: RV hypertrophy among COPD patients

Gold staging	RV hypertrophy	P value
Mild	4	0.82
Moderate	42	
Severe	38	
Very severe	12	

Table 4: RV dilatation among COPD patients

Gold staging	RV dilatation	P value
Mild	6	0.75
Moderate	40	
Severe	36	
Very severe	14	

RV dilatation was seen in 6 patients with mild, 40 patients with moderate, 36 patients with severe and 14 patients with very severe COPD. The difference was non- significant ($P > 0.05$) [Table 3].

DISCUSSION

There are about 400 million people are who are affected by COPD worldwide and in India the estimated prevalence of COPD is 3.67% (Among males it is 4.46% and 2.86% among females) among general population.^[8] There are about 15 million COPD cases in India (9.02 million males and 5.75 million females, respectively).^[9] Globally, COPD is the ninth leading cause in terms of years of life lost due to disability (DALYs) 5 which in turn in India account for 3% of DALYs 6 and the total deaths in India is estimated to be around 500,000 deaths per year.^[10] We performed this study to assess COPD severity and right heart status among patients attending a tertiary care hospital.

Our results showed that out of 96 patients, males were 50 (52.1%) and females were 46 (47.9%). Premananth et al,^[11] found that out of total 120 COPD patients, 108 (90%) were male and 12 (10% were female). Majority of patients belong to the age group 50-59 years (40%). Second highest age group

According to GOLD staging, cases were mild in 5, moderate in 44, severe in 40 and very severe in 7 cases. The difference was significant ($P < 0.05$) [Table 2].

RV hypertrophy was seen in 4 patients with mild, 42 patients with moderate, 38 patients with severe and 12 patients with very severe COPD. The difference was non- significant ($P > 0.05$) [Table 3].

was 60-69 years (34%). Right Ventricular hypertrophy was seen in 96 patients contributing to 80%. 50% of mild COPD had RV hypertrophy. 75% of moderate COPD had RV hypertrophy. 91.6% of severe COPD had RV hypertrophy. 100% of very severe COPD had RV hypertrophy. RV dilatation was seen in 68 patients contributing to 57% of total 120 COPD patients. 37.5% of mild COPD had RV dilatation, 50% of moderate patients had RV dilatation, 52% of Severe COPD had RV dilatation, 100% of very COPD patients had RV dilatation. RA dilatation was seen in 21 patients contributing to 17.5% of COPD patients. None of the mild COPD has RA dilatation, 8% of moderate COPD had RA dilatation, 18.75% of severe COPD had RA dilatation, 50% among very severe COPD had RA dilatation.

According to GOLD staging, cases were mild in 5, moderate in 44, severe in 40 and very severe in 7 cases. Mannino et al,^[12] did analysed data from 20,296 subjects aged $>$ or $=$ 45 years at baseline in the Atherosclerosis Risk in Communities Study (ARIC) and the Cardiovascular Health Study (CHS). In logistic regression models adjusting for age, sex, race, smoking, body mass index and education, subjects with GOLD stage 3 or 4 COPD had a higher prevalence of diabetes, hypertension and cardiovascular disease. Comorbid disease was

associated with a higher risk of hospitalisation and mortality that was worse in people with impaired lung function. Lung function impairment is associated with a higher risk of comorbid disease, which contributes to a higher risk of adverse outcomes of mortality and hospitalisations.

Our results showed that RV hypertrophy was seen in 4 patients with mild, 42 patients with moderate, 38 patients with severe and 12 patients with very severe COPD. Krishnan et al,^[13] in their study found that COPD is more common in males than females in the ratio of 5.25:1. Majority of patients (46%) had a mean of 8.4 years of smoking history. Most common symptoms and signs observed are dyspnea (100%), cough (96%) and tachypnoea. Signs suggesting cor pulmonale are parasternal heave, loud P2 and elevated JVP. Radiological study revealed emphysema in 52% and prominent right descending pulmonary artery suggesting PAH in 25%. ECG findings are suggestive of RV dysfunction i.e., P-pulmonale, Right axis deviation (RAD), incomplete RBBB and RVH. Echocardiographic signs of RV dysfunction observed are PAH, cor pulmonale and RVSD which are correlated with the severity of the disease.

Our results showed that RV dilatation was seen in 6 patients with mild, 40 patients with moderate, 36 patients with severe and 14 patients with very severe COPD. Gupta et al,^[14] assessed the cardiac changes secondary to COPD by echocardiography and to find out the correlation between echocardiographic findings and severity of COPD. A total 40 of patients of COPD were selected and staged by pulmonary function test (PFT) and evaluated by echocardiography. On echocardiographic evaluation of COPD, 50% cases had normal echocardiographic parameters. Measurable tricuspid regurgitation (TR) was observed in 27/40 cases (67.5%). Pulmonary hypertension (PH), which is defined as systolic pulmonary arterial pressure (sPAP) > 30 mmHg was observed in 17/27 (63%) cases in which prevalence of mild, moderate, and severe PH were 10/17 (58.82%), 4/17 (23.53%), and 3/17 (17.65%), respectively. The frequencies of PH in mild, moderate, severe, and very severe COPD were 16.67%, 54.55%, 60.00%, and 83.33%, respectively. Right atrial pressure was 10 mmHg in 82.5% cases and 15 mmHg in 17.5% cases. Cor pulmonale was observed in 7/17 (41.17%) cases; 7.50% cases had left ventricle (LV) systolic dysfunction and 47.5% cases had evidence of LV diastolic dysfunction defined as $A \geq E$ (peak mitral flow velocity of the early rapid filling wave (E), peak velocity of the late filling wave caused by atrial contraction (A) on mitral valve tracing) Left ventricle hypertrophy was found in 22.5% cases.

CONCLUSION

The most common echo finding was RV hypertrophy. Routine echocardiography should be performed in patients with COPD for early detection of right heart changes like pulmonary hypertension, RV hypertrophy and dilatation, RA dilation, diastolic dysfunction in order to initiate treatment and to reduce the morbidity and mortality.

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