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Impact on Left Ventricular Function of Acute Exacerbation of Chronic Obstructive Pulmonary Disease.

Akansha Gupta[1], Y.N. Verma[2]

[1]PG3, Department of General Medicine, Geetanjali Medical College and Hospital, Udaipur.
[2]Professor, Department of General Medicine, Geetanjali Medical College and Hospital, Udaipur.

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ABSTRACT

Background: To Study the Impact on Left Ventricular Function of Acute Exacerbation of COPD. **Methods:** The study was conducted in the Department of General Medicine, Geetanjali Medical College & Hospital from September 2017 to September 2019, on 65 patient with a diagnosis of COPD as per Global Initiative for Chronic Lung Disease 2017 guideline with Acute Exacerbation. Patients were assessed on the basis of comorbidities, history, clinical examination, blood investigations, 2D Echo, ECG and X Ray chest. **Results:** Most common age group was 51-60 years. Most of the patients presented with cough with sputum, shortness of breath, fever. In our study 16 patients had clubbing, 14 had pedal edema, 10 patients had anemia, 8 had cyanosis, 4 had lymphadenopathy. Most patients were smokers and tobacco chewers. Most common ECG finding was LVH followed by P pulmonale and ECHO finding was Diastolic dysfunction and LVH, followed by Tricuspid regurgitation. **Conclusion:** The present study, revealed that Left Ventricular Hypertrophy is the most common finding and pathology in Acute Exacerbation of COPD in Electrocardiogram, and in Echocardiograh the most common findings were diastolic dysfunction and Left Ventricular Hypertrophy. So, in present study there is presence of Impact on Left Ventricular Function in cases of Acute Exacerbation of COPD.

Keywords: COPD, Left Ventricular Function.

INTRODUCTION

Global initiative for Chronic Obstructive Pulmonary Disease (GOLD) defines Chronic Obstructive Pulmonary Disease (COPD) as a- "preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in individual patients". The prevalence of COPD in adult population ranges between 4% and 10% and World Health Organization projections predict that COPD - related mortality and disability will continue to increase worldwide during the next two decades.[1] It remains a major public health problem and is projected to be rank fifth, in 2020 in burden of disease world wide.[2]

Concomitant heart disease during the course of chronic obstructive pulmonary disease is well recognized. The prevailing view is that mainly the right side of the heart is involved.[3] While the issue of left ventricular (LV) involvement is controversial and less studied. Hence, the need for this study on lung function and cardiac dysfunction in patients of COPD to understand study.

Most of the increased mortality associated with COPD is due to cardiac involvement. Cardiovascular disease accounts for approximately 50% of all hospitalizationand nearly one third of all deaths, if forced expiratory volume in one second (FEV1)>50% of predicted.[4] In more advanced disease cardiovascular disease account for 20%–25% of all deaths in COPD.[5]

Acute exacerbations forms the major component of economical burden of COPD.[6] AECOPD also leads to indirect costs because of days lost from work.[7] It is the important factor of mortality in COPD patients. Acute Exacerbation of Chronic Obstructive Pulmonary Disease cause great impact on individual health and health care system in India also.[8] Acute exacerbations can contribute to irreversible progression of disease.[9] Therefore timely institution of correct management is imperative for better prognosis of disease.

Patients with COPD also carries an increased risk of mortality and morbidity due to arrhythmia, myocardial infarction (MI), or congestive heart failure (CHF) compared to those who do not.[10] Therefore cardiac abnormalities clearly contribute to overall morbidity and mortality associated with COPD and understanding of their role and potential for treatment is vital. Since there is paucity of

Name & Address of Corresponding Author
Dr. Akansha Gupta,
Department of Medicine,
Geetanjali Medical College and Hospital,
Udaipur.

literature on cardiovascular involvement in COPD in India. Hence the present study is proposed with mentioned aims and objectives.

Aim and Objectives

1. To Study the Impact on Left Ventricular Function of Acute Exacerbation of COPD.
2. To study the Left Ventricular Function in COPD.

MATERIALS AND METHODS

The study was conducted in the Department of General Medicine, Geetanjali Medical College & Hospital from September 2017 to September 2019, on 65 patients who were admitted from casualty and outpatient department with a diagnosis of COPD as per Global Initiative for Chronic Lung Disease 2017 guideline with Acute Exacerbation

Inclusion Criterias

1. COPD symptoms with acute exacerbation who is a known case of COPD.
2. Age more than 18 years of both sexes.
3. Patients with informed consent.

Exclusion Criterias

1. Patients with history of asthma or FEV1 increased more than 12% and 200 ml after bronchodilation.
2. Patients not willing to be evaluated.
3. Patients with active pulmonary tuberculosis.
4. Patients with history of any ischemic heart disease.
5. Patients who will not able to perform spirometry test.

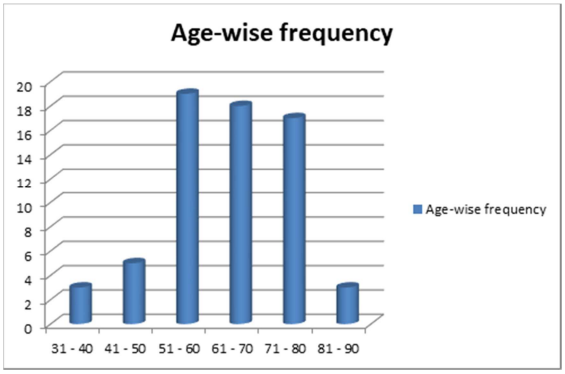
Patients were assessed on the basis of 1) Demographic variables 2) Comorbidities 3) History and Clinical Examination 4) Arterial Blood Gas Analysis 5) 2D Echo 6) ECG –SOKOLOW –LYON Criteria 7) Spirometry 8)X Ray chest 9) CBC, RBS, RFT, LFT.

Written consent was taken from all patients. Patients were interviewed regarding symptoms, any exposure to risk factors, occupation, past medical history (especially hypertension, diabetes mellitus, exacerbation or any prolong hospitalisation), family history of COPD, or other chronic respiratory disease and presence of complications and co morbidities. All patients were subjected to Spirometric evaluation. Bronchodilator reversibility testing was done. Modified British medical council research (mMRC) scoring was done to evaluate the grades of dyspnoea on the basis of daily activities of the patients.

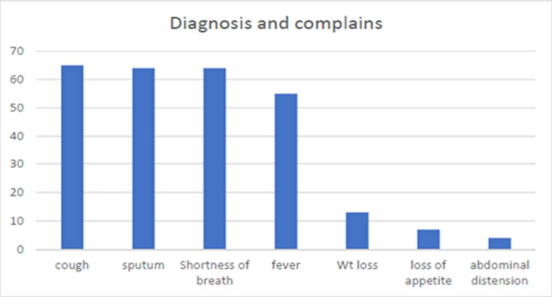
A meticulous record of the demographic data, clinical presentation, radiological findings, laboratory reports, clinical progress, complications, duration of hospital stay was maintained in a specially prepared proforma for this purpose. A statistical review of all relevant data was done.

RESULTS

The mean age in present study was 64.77 years and standard deviation was 11.52 years. The most common age group was 51-60 years.



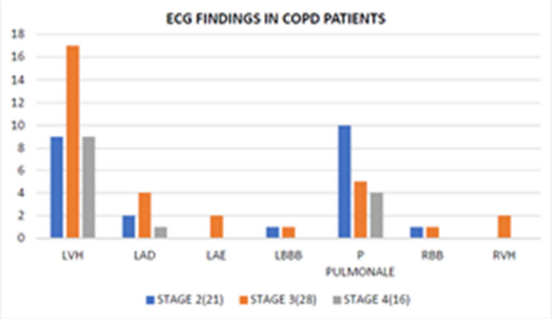
In present study male preponderance was seen. Majority of the patients had complaints of Cough with Sputum, shortness of breath, fever followed by weight Loss, loss of Appetite and Abdominal Distension. In present study 16 patients had Clubbing, 14 had Pedal Edema, 10 patients had Anemia, 8 had Cyanosis, 4 had Lymphadenopathy.

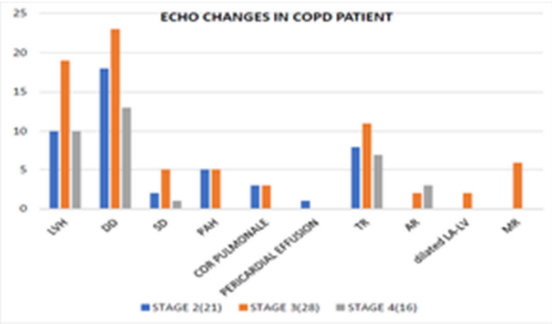


Most of the patients were smokers and tobacco chewers in present study.18 patients had tachycardia, few were hypertensive and most had tachypnoea. 41 patients had fever and oxygen saturation of all patients was below 90%.FEV1 and COPD stage according to GOLD criteria.

FEV1	Stage	Freq
>80	1	0
50-79	2	21
30-49	3	28
<30	4	16

The most common type of COPD in our patients was stage 3 COPD according to GOLD classification.
In our study the most common ECG finding is LVH followed by P pulmonale





In our study, the most common ECHO finding was Diastolic dysfunction andLVH, followed by Tricuspid regurgitation.

DISCUSSION

Chronic Obstructive Pulmonary Disease (COPD) is characterized by chronic airflow limitation and is associated with significant extra-pulmonary effects. Cardiovascular disease is a common cause of mortality in COPD. The mean age in our study was 64.77 and standard deviation was 11.52 years. The most common age group was 51-60 years. This finding was similar to previous study of arpit verma et al. In our study male preponderance was seen this finding was similar to the study of arpit verma et al who reported, 83.11% (64/77) cases were males. Smoking which contributes to COPD and is observed mainly among males may explain predominance of males among our COPD cases.[11]

In our study majority of the patients had complains of cough with sputum, shortness of breath, fever followed by weight loss, loss of appetite and abdominal distension. In Mohamed et al study lower limb edema, congestion of veins and cyanosis were common. Exertional dyspnoea is the classical symptom of COPD and is also the clinical manifestation of HF due to LV dysfunction. Even cough can be present in HF, likely because of stimulation of juxta capillary pulmonary receptors or the rapidly adapting receptors in the proximal airways. In ArpitVerma et al study, breathlessness, cough with sputum, fatigue, fever and edema were common.

In our study the most common ECG finding was Left Ventricular Hypertrophy followed by P pulmonale. The most common Echocardiographic finding was Diastolic Dysfunction and Left Ventricular Hypertrophy, followed by Tricuspid Regurgitation. Hypoxia is involved in Pulmonary vascular remodeling that increases pulmonary vascular resistance, which may negatively affect LV diastolic filling by the phenomenon of ventricular interdependence.Pulmonary hypertension caused by COPD essentially involves the right heart, left ventricular function may also be affected. There are a few studies demonstrating that LV diastolic function may be impaired in patients with COPD presenting with a recent symptomatic deterioration.

The Ying-Shuo Huang study observed a high frequency of LVDD in patients with COPD (65.6%), but there was no difference among different stages of COPD. In agreement with these results, Boussuges et al found a high frequency of LVDD in patients with COPD (76%).[12,13] Funk et al also reported a prevalence rate of more than 50%. A recent study showed more frequent echocardiographic findings of mild LVDD (88%) in COPD patients, independently of COPD stage.

The potential pathophysiologic mechanism for the association between COPD and LVDD and HFpEF could be systemic inflammation. Inflammation is considered to be one of the systemic manifestations of COPD. Furthermore, the presence of corpulmonale secondary to pulmonary hypertension can lead to interventricular septum deviation toward the left ventricle, which could alter LV structure and delay filling compliance. This mechanism could explain why COPD severity was associated with worse diastolic function.[14] In NK gupta et al study, left ventricular systolic dysfunction (LVSD) is present in 7.5% patients, in previous studies it was present in 4%-32% patients of COPD. LVDD was seen in COPD patients with normal pulmonary arterial pressure and it increased with right ventricular after load. In our study LVDD is present in 54 patients, out of which 38 patients had PH, various mechanisms might explain the presence of left diastolic dysfunction in COPD patients. This may be due to chronic hypoxemia leading to abnormalities of myocardial relaxation, lung hyperinflation,and distension leading to increased stiffness of the parietal pleura and thus of the wall of cardiac fossa leading to added load on ventricle, and also due to ventricular interdependence.[15-20] In another study of Vizza CD et al reported left ventricular dysfunction (left ventricular ejection fraction [LVEF] <45%) was present in only 6.4%, but it, too, was most common in the group with pulmonary hypertension (19.6%).[21] The prevalence of left heart abnormalities previously reported in COPD patients varies widely, from 0 to 32%.[22]

The prevalence of LVSD in our cohort was similar to that recently reported byMacchia et al (13.7%) and is in keeping with the emerging evidence that unrecognised left heart failure is common in stable COPD patients, as shown by Rutten et al.[23,24] First,

the vascular dysfunction of systemic arteries, assessed by means of flow-mediated vasodilatation, arterial stiffness or carotid intima-media thickness, is more prevalent in COPD and could explain the association with subclinical left ventricle abnormalities. Secondly, the presence of emphysema has been related to impaired left ventricle filling. It is convincible that hyperinflation and increased intrathoracic pressures produced by emphysema may impair cardiac function by decreasing biventricular preload andincreasing left ventricular afterload. Thirdly, chronic hypoxaemia might also affect myocardial relaxation, although in our study no relationship was shown between PaO2 and left ventricle impairment. Finally, the influence of chronic right ventricular pressure overload on the interventricular septum may also jeopardize left ventricular filling as a result of abnormal left ventricle torsion and impaired longitudinal and circumferential strain. Whatever the mechanism, it is apparent that the presence of left ventricular dysfunction has a negative impact on COPD survival. Accordingly, the early identification of such comorbidity might help improve patient outcome. In fact, a subgroup of COPD patients who combined mild airflow obstruction with a highproportion of obesity, cardiovascular disorders and diabetes was identified in the PAC-COPD cohort. Interestingly, these patients required more hospital admissions as a result of cardiovascular disease during the follow-up.[25-27]

CONCLUSION

The present study, revealed that Left Ventricular Hypertrophy is the most common finding and pathology in Acute Exacerbation of COPD in Electrocardiogram, and in Echocardiograh the most common findings were diastolic dysfunction and Left Ventricular Hypertrophy.

So, in our study there is presence of Impact on Left Ventricular Function in cases of Acute Exacerbation of COPD.

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