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Original Research Article

A Study of ECG and Echocardiography Findings in Patients with COPD

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Abstract:

Background: COPD is a very common preventable disease. Cardiac involvement is common in COPD patients. Early detection of cardiac involvement by ECG, Echocardiography can prevent morbidity and mortality in COPD patients.

Aim: To study clinical profile and to assess cardiac dysfunction in COPD patients by ECG and Echocardiography.

Method: An observational study was done in COPD patients age >30 years in civil hospital, navsari. ECG, Echocardiography were done .Responses were collected and analysed by Microsoft excel.

Result: ECG findings in copd patients - right axis deviation (44%), P pulmonale (37%), and low voltage QRS complex (10%) poor R wave progression (39%), right ventricle hypertrophy (26%). Echocardiography findings were PAH (62%), corpulmonale (56%), RVD (45%), RAD (37%) right ventricle hypertrophy (27%), left ventricle systolic dysfunction(31%), left ventricle diastolic dysfunction(6%).

Conclusion: COPD is a common and preventable disease. COPD patients should be assessed by ECG and echocardiography for better prognosis and to prevent complication.

Keywords: COPD, ECG, Echocardiography.

Introduction

Chronic obstructive pulmonary disease is one of the most important causes of morbidity and mortality throughout the world [1].The COPD burden is expected to rise in coming years because of continuous exposure to risk factors and aging of the population [2].

COPD is very common, treatable & preventable disease. It is characterized by respiratory symptoms due to alveolar; airway abnormalities and exposure to noxious gases or particles .Dyspnoea, cough and sputum production are the most common symptoms. Important risk factor is smoking. Other environmental factors which contribute are air pollution & biomass fuel. Host factors that predispose to COPD include abnormal lung development, genetic abnormalities and accelerated ageing [3].

Cardiac involvement is common in patients with COPD particularly in those with low oxygen saturation [3]. It is essential to assess the extent of impairment of pulmonary function and the pulmonary hypertension caused by the same to establish the long-term prognosis of the disease. It affects the function of right ventricle leading to corpulmonale and has a poor prognosis [3]. So, early recognition of RV dysfunction and pulmonary hypertension may help in treatment and prolonging the survival of patients with corpulmonale.

The aim of this study is to study the clinical profile of patients and to assess ventricular dysfunction by utilizing ventricular parameters (obtained by clinical methods, electrocardiography & echo cardiography) and to correlate it with severity of COPD. Early recognition and treatment of ventricle dysfunction in COPD leads to prolong survival and improve quality of life.

Method

A prospective type of observational study was done in COPD patients above 30 years of age, attending the outpatient clinic and who were admitted in medicine and pulmo medicine unit in navsari civil hospital were selected for this study. 100 patients who fulfilled the inclusion & exclusion criteria were selected. Data has been collected over 2 year.

Inclusion Criteria

- COPD patients male & female age > 30 year with taking consent.

Exclusion Criteria

- Patients have known respiratory condition other than COPD.
- Patients having cardiac disease.
- Patients in whom meaningful examination could not be performed were also excluded.

All patients were diagnosed clinically and satisfying the spirometric criteria was included in this study. All patients were subjected to routine blood investigation, sputum analysis for AFB stain, gram stain, culture and drug sensitive test, ECG, chest X -ray, Echo cardiography, and pulmonary function test was done using spirometry. Responses were collected and analysed by Microsoft excel.

Result

It was a prospective type observational study conducted in 100 cases of COPD. All cases were diagnosed clinically and confirmed by spirometry. Mean age of patient was 55.02 ±10 year.

In this study 84% patients were male; all males were smokers. 16 % were female; all females were exposed to biomass fuel. The mean duration of smoking observed was 26.8 ± 3.5 years. Majority of smokers (63%) had history of smoking more than 20 pack years. The mean duration of disease was 4.08 ± 3.2 years. Most of the patients had breathlessness (92%), cough with sputum (85%), swelling of feet (34%), fever (8.5%). The clinical signs at presentation were tachypnoea (75%), loud P2 (36%), parasternal heave (23%); evidence of congestive cardiac failure like raised JVP (34%), pedal edema (24%), ascites (6%). A wide range of COPD severity was found. Although, the majority of patients had moderate to severe disease.

Table 1: Disease severity (FEV1 of % Predicted)

Disease severity (FEV1 of % Predicted)	No. of patients	Percentage
Mild	7	7%
Moderate	44	44%
Severe	38	38%
Very severe	11	11%

The chest X-ray findings were hyperinflation of lung (73%), increased bronchovascular marking (54%), evidence of pulmonary hypertension i.e. Prominent right descending pulmonary artery (28%), cardiomegaly (13%) were observed. The ECG findings in copd patients were right axis deviation (44%), P pulmonale (37%), and low voltage QRS complex (10%) poor R wave progression (39%), right ventricle hypertrophy (26%). Echocardiography findings were PAH (62%), corpulmonale (56%), RVD (45%), RAD (37%) right ventricle hypertrophy (27%), left ventricle systolic dysfunction(31%), left ventricle diastolic dysfunction(6%).

Discussion

COPD is considered a worldwide cause of chronic morbidity and mortality [4]. COPD is a male dominant disease, due to higher prevalence of smoking and having more susceptibility than female [3].This study is similar to manasa reddy et al [5], bennita et al [6], suma et al [7], swathi talari et al [8]**.** In this study ECG changes were Right axis eviation (44%), P pulmonale (37%), low voltage QRS complex (10%), poor R wave progression (39%), RVH (26%). ECG changes observed in this study correlates with manasa reddy et al [5], sachin et al [9], padmavati & raizada et al [10], sekhar et al [11]. P pulmonale, RVH, right axis deviation in copd is due to change in haemodynamics of pulmonary vessels secondary to hypoxia [12]**.** Hyperinflation of lung in COPD causes poor R wave progression, low voltage QRS complex [12]. In this study most common echo finding was pulmonary arterial hypertension (82%). It appeared more in severe and very severe grade of copd than in mild/ moderate grades. There is significant structural changes occur in patients with COPD, alveolar hypoxemia and chronic ventilator insufficiency leads medial hypertrophy & intimal insufficiency which causes pulmonary vaso constriction, pulmonary vessel bed destruction [3]. Similar findings were seen in suma et al [7], sekhar et al [11], Benita et al [6], mansa reddy et al [5], yaseer et al [13]. Rise in PAH causes increase after load which leads structural and functional changes in right ventricle i.e. right ventricular hypertrophy, right ventricle dilatation, right atrial dysfunction, corpulmonale [3]. In this study right ventricular dilatation (45%), corpulmonale (56%), right atrial dilatation (37%), right ventricle hypertrophy (27%). Similar findings were seen at mansa reddy et al [5], N.K. gupta et al [14]. In this study 31% patients had left ventricle systolic dysfunction whiile 6% had left ventricle diastolic dysfunction. In COPD patient's hyper inflated lungs, reduced stroke volume and right ventricle dysfunction leads reduced left ventricle systolic dysfunction [3]. Similar findings were seen in N.K GUPTA et al [14], yasir et al [13], mansa reddy et al [5].

Conclusion

COPD is a common respiratory disease. This study shows presence of cardiac comorbidity in COPD patients. ECG, echocardiography can be used for screening of COPD. Echocardiography has a better

modality for detection of cardiac abnormality than ECG. Echocardiography is less informative than pulmonary catheterization; being noninvasive and easily available echocardiography routinely recommends in copd patients. This study suggests early cardiac screening of all COPD patients should be done to assess prognosis and for better outcome.

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