Original Research Paper

Volume-9 | Issue-1 | January-2019 | PRINT ISSN - 2249-555X

General Medicine

A STUDY ON CORRELATION OF ELECTROCARDIOGRAPHIC AND ECHOCARDIOGRAPHIC PROFILE OF COPD PATIENTS

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ABSTRACT

OBJECTIVE: To study the variations and severity in clinical presentations of COPD patients. To correlate ECG and EHCO findings with variable clinical presentation of disease.

METHODS: 50 patients admitted with signs and symptoms of COPD. Patients were randomly selected over two years and studied with a detailed history including symptoms, duration of smoking and physical examination. They were investigated with spirometry, ECG and echocardiography. Patients were graded into Mild, Moderate and severe categories according to BTS criteria.

RESULTS: Mean age was 62.28±7.7 years with male predominance. Mean duration of disease was 6 years. Patients had a mean duration of smoking of 21.9 ±8.7 pack years. ECG and Echo findings that showed significant correlation with severity were 'p' pulmonale, right axis deviation, right bundle branch block, right ventricular hypertrophy and poor 'r' wave progression, RA & RV dilatation, RV failure, pulmonary hypertension and cor-pulmonale. In COPD patients Corpulmonale was diagnosed, by clinical Method 30%, Electrocardiography 40% and Echocadiography 46%.

CONCLUSION: COPD is more common in males in 5th to 7th decade with the smoking history of more than 20 pack years. Most patients have moderate to severe disease at presentation. The incidence of ECG and Echo findings increase as the severity and duration of the disease increases and echocardiography is better than ECG or clinical methods in detecting RV dysfunction.

KEYWORDS : COPD, ECG, Echocardiography, Cor-pulmonale.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic morbidity and mortality throughout the world. Many people suffer from this disease for years and die prematurely from it or its complications.COPD is currently the 4th leading cause of death in the world and further increases in its prevalence and mortality can be predicted in the coming decades. [1]

This increased mortality is driven by the expanding epidemic of smoking and the changing demographics in most countries. The Global Burden of Disease Study estimates that COPD results in 1.68 YLD per 1,000 population. COPD is characterized by slowly progressive air flow obstruction, resulting in dyspnoea and exercise limitation, and pulmonary arterial hypertension is its major cardiovascular complication.[2]

Right ventricular (RV) dysfunction is common in patients with COPD particularly in those with low oxygen saturation. It occurs in upto 50% of the patients with moderate to severe COPD.[3]

This study was undertaken to study the electrocardiographic and echocardiographic changes in COPD patients with different grades of severity of the disease, as assessed clinically and through pulmonary function testing[4].

Further, an attempt has been made to compare the electrocardiographic and the echocardiographic changes, with respect to duration and severity of the disease and to see which of them is a better predictor of right ventricular dysfunction in COPD, so that the patients can be identified at an earlier stage of the disease, as early recognition and treatment of right ventricular dysfunction in COPD, leads to prolonged survival and improved quality of life[5].

AIMS AND OBJECTIVES

1. To study the variations and severity in clinical presentations of COPD patients
2. To correlate ECG and EHCO findings with variable clinical presentation of disease.
3. To study the prevalence of Right ventricular hypertrophy and Right ventricular dysfunction.

METHODOLOGY

Patients admitted with signs and symptoms of COPD diagnosed clinically, both male and female, in Osmania General Hospital, Hyderabad.

(A) INCLUSION CRITERIA

Patients of age between 50yrs and 80yrs, with history of cough with expectoration of at least 3 months duration in 2 consecutive years. Patients with history of breathlessness of long standing duration with or without cough.

(B) EXCLUSION CRITERIA

Patients with pulmonary pathology like bronchial asthma, bronchiectasis, tuberculosis, pneuomoconiosis, restrictive lung disease like kyphoscoliosis etc. Patients with Rheumatic, Congenital or ischemic heart disease and hypertension.

DATA ANALYSIS

Statistical analysis was done with Chi-square test (Epi info software version 3.5.3) and statistical

significance was taken as $p < 0.05$. Chi-square test and p value was calculated in each category (of duration of disease /severity) for patients with findings (of ECG/ECHO) and without findings.

OBSERVATIONS & RESULTS

50 cases of COPD, which meet inclusion and exclusion criteria, admitted in Department of General Medicine, Osmania General Hospital, AfzalGunj, Hyderabad, Telangana State.

In this study 84% of the patients were males and 16% were females. The mean age was 62.28(±7.7) years, range 50-80 years. The maximum incidence of COPD in this study is among the age group 50-70 years i.e. in the 6th and 7th decade (82%).

TABLE 1 : CORRELATION OF TOBACCO EXPOSURE WITH DISEASE SEVERITY

Smoking Duration (in Pack Yrs)	Mild		Moderate		Severe	
	NO	%	NO	%	NO	%
10 – 19	3	6	9	18	2	4
20 – 29	1	2	5	10	10	20
30 – 39			1	2	7	14
>40					4	8

Majority of the patients with severe disease had history of greater than 20 pack years of tobacco exposure.

TABLE 2 : CORRELATION OF ECG FINDINGS WITH SEVERITY OF THE DISEASE

ECG FINDING	Mild (n=4)		Moderate (n=18)		Severe (n=28)		X^2	p
	NO	%	NO	%	NO	%		
P Pulmonale	1	25	5	28	20	71	9.63	<0.001
Right Axis Deviation	1	25	3	17	19	68	14.48	<0.001
Poor r wave Progression			1	6	13	46	10.77	<0.001
Incomplete RBBB			1	6	6	21	3.00	0.22
RVH			3	22	17	64	11.28	<0.001

In the moderate category, 78% of the patients had some ECG changes (i.e. 14/18), 17% of the patients had ECG evidence of RVH (i.e. 3/18), 28% of the patients had 'p' pulmonale (i.e. 5/18), 68% (19/28) had right axis deviation and 60%(1/28) evidence of right ventricular hypertrophy, P-pulmonale was present in 71% in the patients in severe category, P-pulmonale RAD,poor'r'wave progression and RVH correlate significantly with severity of disease.

TABLE : 3 CORRELATION OF ECHOCARDIOGRAPHIC FINDINGS WITH SEVERITY OF THE DISEASE

ECHO FINDING	Mild (n=4)		Moderate (n=18)		Severe (n=28)		X^2	p
	NO	%	NO	%	NO	%		
RA Dilation			4	22	18	64	11.28	<0.05
RV Dilation			4	22	18	64	11.28	<0.05
RV Hypertrophy			2	11	15	54	11.04	<0.05
RV Failure			3	17	8	29	2.13	0.34
IVS motion Abnormality			3	17	11	39	4.47	0.10
Pulmonary Hypertension	1	25	5	28	19	68	13.68	<0.05

In the mild group only 1 patient had echo evidence of pulmonary hypertension and no patient had evidence of cor pulmonale. In the moderate group, 28% (i.e. 5/18) of the patients had echocardiography evidence of pulmonary hypertension. In the severe group, 68%(i.e.19/28) of the patients had echo evidence of pulmonary hypertension . Only in the severe group 28%(i.e. 8/28) of the patients had echo evidence of R. V. failure. The echo signs of RA dilatation, RV dilatation, pulm hypertension and RVH correlated significantly with the severity of the disease ($p < 0.05$).

DISCUSSION

50 COPD cases which meet inclusion and exclusion criteria, admitted in medical wards of Osmania General Hospital were taken in this study. Electrocardiographic and echocardiographic changes seen in COPD patients were studied and correlated to the duration and severity of the disease.

In this study the male : female ratio was 5.25:1, i.e. males form 84%(42/50) of the study subjects. This higher incidence of COPD in males can be attributed to smoking. In our study none of the females were smokers but all of them had history of cooking with dried wood fuel. Males : Females ratio in other studies. Previous studies also showed similar incidence in male , J. C. Banergea 1966 [6] (80%),

The maximum number of COPD patients (41/50) in this study were in the age

group of 50-69 years with mean age 62.28(±7.7) years, which is almost similar to previous. In this we have taken patients with age between 50and 80Yrs, Gupta and Khastgir et al, 1989 7 (50.2 ± 12 yrs).

In this study, majority of the patients (28/50) had a history of tobacco use of atleast 20-39 pack-years, with a mean of 21.9 years (±8.7). And according to BTS guide lines most patients with COPD have at least in 20 pack years of smoking history8.

The likely explanation (given by them) is that a ventilatory capacity of <45% of predicted is

inadequate to maintain normal blood gases in the face of inequalities of ventilation and

V/Q ratios and it has been repeatedly shown that pulmonary hypertension is correlated with degree of arterial oxygen desaturation and hypercapnea.9A. G. Chappell 1966 10 also studied 112 patients, dividing them into 2 groups, one with FEV1 < 1200 ml and other with > 1200 ml and found that, R. V. hypertrophy, 'p' pulmonale and vertical 'p' axis occurred more frequently in patients with widespread emphysema than in the other group.

In the present study, the incidence of all the echocardiographic findings increased as the severity of the disease increased, i.e. maximum incidence was found in the most severely affected group of patients.

Danchin et al (1987) in his study compared echocardiographic parameters in COPD patients, with and without history of right heart failure, and found that patients who had no history of right heart failure had smaller right ventricular areas, that those with one or more episodes of right heart failure.

This implies that patients with history of right heart failure i.e. more severe disease are more likely to have right ventricular enlargement thus correlating with the finding in the present study.

In this study the diagnosis of cor-pulmonale could be made in 30% by clinical method, 40% by electrocardiographic method and 46% by echocardiographic method. This clearly shows that echocardiography is better than ECG or clinical methods, to detect the presence of cor pulmonale in patients with COPD.

But most studies report that adequate examination can be obtained in more than 70% of the patients. Reliable echo measurements obtained in different studies were : - Danchin et al,32 80%, Starling et al31 64%, Present study 71%.

CONCLUSION

- COPD is a fairly common disease among the respiratory patients admitted in the Hospital. It is more common in males and in the 6th and 7th decade.
- Severity of disease increases with pack years of smoking.
- Severity of disease increases with duration of disease.
- Most of the patients have fairly advanced disease at presentation.
- ECG and echocardiography are better than clinical methods in detecting Right to ventricle dysfunction in COPD.
- The incidence of ECG changes and echocardiographic findings are more common as the disease duration and severity increase.
- Echocardiography is better than ECG in the diagnosis of RV dysfunction in COPD.

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