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Original Research Article

A cross sectional study of clinical profile and evaluation of pulmonary hypertension in Chronic Obstructive Pulmonary Disease patients in a tertiary care hospital of Mangalore, India

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ABSTRACT

Background: The objectives was to study the clinical profile of COPD patients and to evaluate pulmonary hypertension in COPD patients by non-invasive methods.
Methods: A prospective observational study of patients who satisfy all inclusion and exclusion criteria in OPD or admitted in medical wards of AJIMS Mangalore. The study was conducted from October 2017 to October 2018 with the sample size of 90 subjects
Results: Out of 90 subjects 53 (58.8%) of them had pulmonary hypertension. Among the subjects who had pulmonary hypertension 29 (54.72%) of them had moderate pulmonary hypertension, 17 (32.08%) of them had severe pulmonary hypertension and 7 (13.20%) of them had mild pulmonary hypertension. Mean age among the subjects who had pulmonary hypertension was 64.24±7.62yrs and mean age among the subjects who didn't had pulmonary hypertension was 51.87±8.97yrs. There was a statistically significant difference found between mean age and pulmonary hypertension. Mean duration of diseases among the subjects who had pulmonary hypertension was 8.13±1.74yrs and Mean duration of diseases among the subjects who didn't had pulmonary hypertension was 5.36±1.98yrs. There was a statistically significant difference found between mean duration of disease and pulmonary hypertension.
Conclusions: Due to high prevalence of pulmonary hypertension we suggest screening for the all COPD patients for cardiac complications. This will help in identifying the individual who requires close monitoring and also in reducing the mortality.

Keywords: COPD, Pulmonary hypertension, Non-invasive methods

INTRODUCTION

The Global Initiative for Obstructive lung disease defines Chronic Obstructive Pulmonary Disease (COPD) as, "COPD is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by chronic airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with abnormal inflammatory response of the lungs to noxious particles and gases."[1]

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of health care burden worldwide and the only leading cause of death that is increasing in prevalence. It is the fourth leading cause of death, and by

2020, is expected to rise to the 3rd position as a cause of death.[2]

Pulmonary hypertension is a serious complication of COPD and is associated with poor prognosis. In general, pulmonary hypertension is said to be present when Mean pulmonary artery pressure (PPA) is more than 25mmHg, in COPD when pressure is above 20mmHg. Pulmonary hypertension associated with COPD is usually mild to moderate, and in <5% patients it is severe. Pressure is known to increase to a great extent during REM sleep, exercise, acute exacerbations which, eventually leads to right heart failure. Thus, early detection and treatment of pulmonary hypertension becomes important to prevent right heart failure.[3,4]

The objectives were to study the clinical profile of COPD patients and to evaluate pulmonary hypertension in COPD patients by non-invasive methods.

METHODS

The study was a prospective observational study of 90 patients at A. J. institute of medical sciences hospital, Mangalore, India between October 2017 to October 2018. Method of data collection:

A prospective observational study of patients who satisfy all inclusion and exclusion criteria in OPD or admitted in medical wards of AJIMS Mangalore.

Inclusion criteria

Clinically diagnosed as COPD (mainly emphysema and chronic bronchitis) with subsequent confirmation by spirometry i.e., FEV1/FVC<0.7.

Exclusion criteria

- Bronchial asthma,
- Pulmonary Tuberculosis (present or past),
- Interstitial lung diseases,
- Valvular heart diseases,
- Acute left ventricular failure and pulmonary edema secondary to other causes (hypertension, ischemic heart disease, cardiomyopathies),
- Primary pulmonary hypertension,
- Bronchiectasis.

Data was collected using a pretested proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations were undertaken. The purpose of the study was explained to the patient and informed consent obtained. Pulmonary function testing was done using Spirobank II S/N V00056 spirometer. Three satisfactory efforts were recorded, and best effort was considered. Broncho dilatation was done using 200µg of inhaled salbutamol using a metered dose inhaler and test was repeated after 15 min. Using non-invasive methods like ECG, chest x-ray, 2-D Echocardiography pulmonary hypertension was evaluated in diagnosed COPD patients.

Statistical methods

Data entry and management was done in excel, pre-determined data format have been introduced as datasets which was incorporated into a single master computer at the base. The data sets were transferred into SPSS after data cleaning and recoding with data definitions.

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean± Standard Deviation and results on categorical measurements are presented in Number and percentage. Significance is assessed at 5% level of significance. Student "t" test (two-tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. The statistical software namely SAS 9.2, SPSS 19.0, Stata 10.1, were used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc.

RESULTS

Mean age was 60.32±8.21yrs. Majority of the subjects 41.1% belong to 61-70yrs age group, followed by 71-80yrs age group around 32.22%, 23.33% of the subjects in 51-60yrs age group and only 3.33% were in 41-50yrs age group. Majority of the subject 82.22 % were male and female were only 17.78%. Majority of the subjects 64.45% were from rural area and 35.55% were from urban area (Table 1).

Table 1: Sociodemographic profile of the study subjects.

Sociodemographic variables	Number of subjects (%)
Age in years	
41-50yrs	3 (3.33%)
51-60yrs	21 (23.33%)
61-70yrs	37 (41.11%)
71-80yrs	29 (32.22%)
Sex	
Male	74 (82.22%)
Female	16 (17.78%)
Place of living	
Urban	32 (35.55%)
Rural	58 (64.45%)
Smoking history	
Yes	67 (74.45%)
No	23 (25.55%)

Majority of the subjects 74.45% of the subject had smoking history and Mean pack years of smoking was 35.54 years with SD of 13.22. (Table 1).

Cough was present in 91.12% of patients, sputum production in 74.45% of patients, breathlessness in 87.78% of patients, weakness and fatigue was present in 46.66% of patients, swelling of lower limbs in 38.88% of patients, fever in 31.11% of the patients and chest pain in 20% of the patients (Table 2).

Table 2: Distribution of subjects according to clinical symptoms.

Symptoms	Number of subjects (%)
Cough	82 (91.12%)
Breathlessness	79 (87.78%)
Sputum	67 (74.45%)
Swelling of lower limbs	35 (38.88%)
Fever	28 (31.11%)
Weakness and fatigue	42 (46.66%)
Chest pain	18 (20%)

Majority of the subjects 43.33% had disease since 6-10years followed by 33.34% of the subjects had >10yrs of duration of disease and 33.33% of the subjects had disease since 1-5years (Table 3).

Table 3: Distribution of subjects according to duration of disease.

Duration of diseases	Number of subjects (%)
1-5 years	21 (23.33%)
6-10 years	39 (43.33%)
>10yrs	30 (33.34%)
Total	53 (100%)

Gold staging was done for all the subjects. Majority of the subject 35.55% had stage 3, followed by 30% subject had stage 2, 23.34% had stage 1 and only 11.11% of subject had stage 4 (Table 4).

Table 4: Distribution of subject according to GOLD staging.

GOLD staging	Number of subject (%)
Stage 1	21(23.34%)
Stage 2	27 (30%)
Stage 3	32 (35.55%)
Stage 4	10 (11.11%)
Total	90(100%)

Out of 90 subjects 53 (58.8%) of them had pulmonary hypertension. Among the subjects who had pulmonary hypertension 29 (54.72%) of them had moderate pulmonary hypertension, 17 (32.08%) of them had severe pulmonary hypertension and 7(13.20%) of them had Mild pulmonary hypertension (Table 5).

Mean age among the subjects who had pulmonary hypertension was 64.24±7.62yrs and mean age among the subjects who didn't had pulmonary hypertension was 51.87±8.97yrs. There was a statistically significant difference found between mean age and pulmonary hypertension (Table 6).

Table 5: Distribution of subjects according to severity of pulmonary hypertension.

Severity of pulmonary hypertension	Number of subjects (%)
Mild Pulmonary hypertension (20-30 mmHg)	7 (13.20%)
Moderate Pulmonary hypertension (30-50 mmHg)	29 (54.72%)
Severe Pulmonary hypertension (>50 mmHg)	17 (32.08%)
Total	53(100%)

Table 6: Association of various factors with pulmonary hypertension.

	Pulmonary hypertension		P value
	Present	Absent	
Age (in years)	64.24±7.62	51.87±8.97	<0.001
Duration of disease (Yrs)	8.13±1.74	5.36±1.98	<0.001
Sex (M:F)	47:6	27:10	0.055
Smoking history			
Absent	11	12	0.211
present	42	25	

Mean duration of diseases among the subjects who had pulmonary hypertension was 8.13±1.74yrs and mean duration of diseases among the subjects who didn't had pulmonary hypertension was 5.36±1.98yrs. There was a statistically significant difference found between mean duration of disease and pulmonary hypertension (Table 6). There was no statistically significant difference found between sex, smoking history with respect to pulmonary hypertension.

Table 7: Distribution of the subjects according to GOLD staging and pulmonary hypertension.

GOLD staging	Pulmonary hypertension		P value
	Present	Absent	
Stage 1	4 (19.04%)	17 (80.96%)	<0.001
Stage 2	15 (55.56%)	12 (44.44%)	
Stage 3	25 (78.12%)	7 (21.88%)	
Stage 4	9 (90%)	1 (10%)	

Among subjects who had stage 1 COPD Majority 80.96% didn't had pulmonary hypertension and only 19.04% had pulmonary hypertension. Among subjects who had stage 2 COPD. Majority 55.56% had pulmonary hypertension and 44.44% did not had pulmonary hypertension. Among subjects who had stage 3 COPD. Majority 78.12% had pulmonary hypertension and 21.88% did not had pulmonary hypertension. Among subjects who had stage 4 COPD majority 90% had pulmonary hypertension and 10% did not had pulmonary hypertension (Table 7).

There was a statistically significant difference found between severity of the diseases and pulmonary hypertension.

DISCUSSION

In our study mean age of the subjects was 60.32±8.21 years which was comparable to Migueres M et al in which mean age was 60±9 years.[5]

In study done by Mohapatra PR et al mean age was 60±10.8 years which was also similar to our study.[6]

In our study Majority of the subject 82.22% were male and female were only 17.78% which was comparable to Migueres M et al in which 93.3% were male and 6.7% were female.[5]

In study done by Mohapatra PR et al in which 96% were male and 4% were female which was also similar to our study.[6]

In our study majority of the subjects 64.45% were from rural area and 35.55% were from urban area which was similar to the study done Goel S et al in which 72.73% of the subjects were from rural and 27.27% were from urban.[7]

In our study majority of the subjects 74.45% of the subject had smoking history and mean pack years of smoking was 35.54 years with SD of 13.22 which was similar to study done by Mohapatra PR et al in which 88% of the subjects had smoking history.[6]

In our study cough was present in 91.12% of patients, sputum production in 74.45% of patients, breathlessness in 87.78% of patients. Symptom profile is comparable with Mahesh et al study.[8]

In our study majority of the subject 35.55% had stage 3, 30% subject had stage 2, 23.34% had stage 1 and only 11.11% of subject had stage 4 whereas in the study done by Lindberg A et al 57% stage 1, 37% moderate stage 2, 5% stage 3 and 1% stage 4.[9]

In our study among the subjects who had pulmonary hypertension 29 (54.72%) of them had moderate pulmonary hypertension, 17 (32.08%) of them had severe pulmonary hypertension and 7 (13.20%) of them had Mild pulmonary hypertension. In study done by Higham MA et al.[10] 68% had severe, 43% had moderate and 25% had mild pulmonary hypertension. In study done by Gupta et al.[11] 17.6% had severe, 23.5% had moderate and 58.8% had mild pulmonary hypertension.

In our study there was a statistically significant difference found between severity of the diseases and pulmonary hypertension which was similar to study done by Gupta et al.[11]

CONCLUSION

Prevalence of the pulmonary hypertension in COPD patients was 58.8%. Pulmonary hypertension in COPD patients had association with age and duration of the disease. With the increase in age, duration diseases the severity of pulmonary hypertension increases. Due to high prevalence of pulmonary hypertension we suggest screening for the all COPD patients for cardiac complications. This will help in identifying the individual who requires close monitoring and also in reducing the mortality.

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