

Clinical profile of chronic obstructive pulmonary diseases in rural population

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a preventable and treatable illness, with a large global burden. The present research was undertaken to study clinical profile of COPD and its complication with radiological, ECG changes and pulmonary function test (PFT) and also find out different risk factor for COPD in rural region. **Method :** Total 100 diagnosed cases of COPD were enroled in the study during a period from November 2017 to October 2019. Data was collected by using a predesigned questionnaire. All relevant investigations were done and patients were followed upon Medicine department till they were discharged. **Results:** The mean age of patients was 62.17 ± 10.76 years with male predominance (92%). All cases had cough with expectoration, 88% had breathlessness, and average duration of illness was 8.93 ± 4.17 years. Majority of cases (85%) were smokers and which was major risk factor for COPD (88%). On clinical examination 48% cases had pedal edema. Most of the cases 28% had FEV1/FVC ratio in 61 to 70%. Maximum cases (50%) were moderate on spirometry. Major ECG change seen was P wave height >2.5 mm in lead I in 28% and QRS axis $>90^\circ$ in 28%. On chest X-ray 66% cases had chronic bronchitis with emphysema. There was statistical significance difference found between spirometry severity and chest X-ray findings ($p=0.03$). **Conclusion:** Although smoking is commonest Etiology of COPD. Radiology, PFT and ECG changes can be used for diagnosis purpose. Computerized spirometry is very much a useful investigation in the management of COPD. FEV1 values can be used as diagnostic, as well as to assess the severity of the disease.

Keywords: Chronic obstructive pulmonary disease, Radiology, Expectoration, Breathlessness, Spirometry, X-ray, Smoking, Etiology

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INTRODUCTION

Chronic obstructive pulmonary diseases (COPD) has been defined by GOLD (Guidelines for obstructive lung disease) as a disease state characterized by airflow limitation that is not fully reversible (with FEV1/FVC $<70\%$). The airflow limitation is usually progressive¹. It

is a major and increasing global health burden of diseases was estimated to be 9.34/1000 in men and 7.33/1000 in women. In India, the prevalence of COPD is shown to be 4.1% with male to female ratio of 1.56:1 in the population of above 35 years of age^{2,3}. Estimates from WHO's Global Burden of Disease and Risk Factors project show that in 2001, COPD was the fifth leading cause of death in high-income countries, accounting for 3.8% of total deaths, and it was the sixth leading cause of death in nations of low and middle income, accounting for 4.9% of total deaths[4]. By 2020 the WHO predicts that COPD will become the leading cause of death and the fifth leading cause of disability worldwide⁵. According to a report published by the Maharashtra State Health Resource Centre, COPD is the leading cause of death in Maharashtra, causing more deaths than those due to ischemic heart disease, stroke and diabetes all together^{6,7}. Often, the prevalence of tobacco

smoking, although in many countries, outdoor, occupational, and indoor air pollution — the burning of wood and other biomass fuels — are major COPD risk factors. The prevalence and burden of COPD are projected to increase in the coming decades due to continue exposure to COPD risk factors and the aging of the world's population⁸. COPD is a disease associated with suffering and poor quality of life due to recurrent exacerbations and associated chronic comorbid conditions. In a source - poor country like India, it is a challenge to curb the growing burden of COPD. Thus, COPD becomes an important public health problem that is treatable. Preventing the development of COPD therefore becomes the most economically viable option to reduce the burden of COPD[9]. There is a paucity of data regarding the clinical profile of COPD , especially in rural areas. Therefore present study was undertaken to study the clinical profile of COPD and its complication with radiological, ECG changes and PFT and to find the different risk factor for COPD in rural region.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval and written informed consent from all the patients, this prospective observational study was carried out in the Department of Medicine at government Rural Tertiary Care Centre during a period of two years from November to October 2019. Total 100 diagnosed cases of COPD and those patients willing to participate in the study were included. Unwillingness of the patients and patients having breathlessness due to primary cardiac cause were excluded from the study. At registration, the basic information especially with respect to clinical findings, socio-demographic factors, and all other investigations included haematological : Hb, TLC, DLC, ESR, sputum for AFB, sputum culture and sensitivity, kidney function test, urine routine microscopy, blood sugar level, chest X-ray PA view and lateral view, ECG, diaphragmatic movement, lung function test : FEV1,FVC were noted. Data was collected by using a predesigned questionnaire which consisted of standard questions related to clinical condition, socio demographic factors, addiction among family members, and so on, were interviewed. In addition, questions related to past and present medical history and health seeking behaviour were also studied. All patients were followed up in Medicine department till they were discharged.

Statistical analysis

All data was collected and complied in Microsoft excel. Results of continuous (quantitative data) measurement were presented on Mean \pm SD (min-max) and result on categorical (qualitative data) measurements was

presented in percentage and proportions(%). Comparison of qualitative variable was analyzed by chi-square test. Wherever necessary between groups, comparison of quantitative variables was analyzed by independent student t test according to distribution. A p value of 0.05 was taken as level of significance and was considered statistically significant. Data analysis was done using R Studio and open epi version 2.3.1.

OBSERVATIONS AND RESULTS

Total 100 cases were enrolled in the study, among them 92 (92%) were male and 8 (8%) were female. Average age of patient was 62.17 ± 10.76 years, ranged from 42 to 82 years. The majority of cases (36%) were in the age group of 61 to 70 years as shown in table1

Table 1: Distribution of cases according to age group

Age in years	No. of case	Percentage
41-50	14	14%
51-60	28	28%
61-70	36	36%
>70	22	22%
Total	100	100%

All cases had cough with expectoration, 88% had breathlessness, 56% had wheezing and 11% had fever, (Figure1).

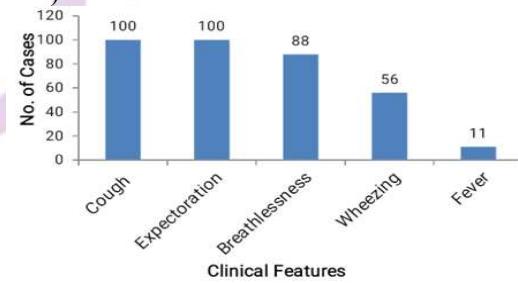


Figure 1: Distribution of Clinical features among the cases

Average duration of illness was 8.93 ± 4.17 years, ranged from 4 to 21 years. The majority of cases (40%) had duration of illness 5 to 10 years, 28% had 10 to 15 years, 26% had ≤ 5 years and only 6% had >15 years. In present study majority of cases 85% were smokers and 15% were non-smokers. Most of the patients (50%) had diabetes mellitus as comorbidity and other co-morbid conditions are shown in figure 2.

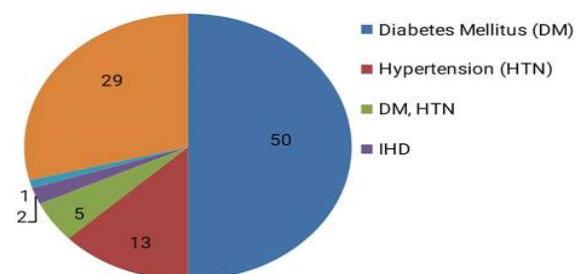
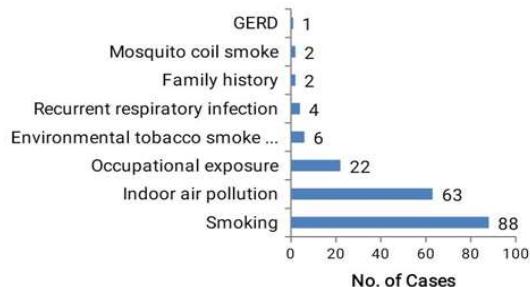


Figure 2: Co-morbidities of patients with COPD

On clinical examination, majority of cases i.e. 48% had pedal edema, 28% had palor, 16% had clubbing, 6% had cyanosis and only 2% had icterus. The major risk factor seen was 88% smoking followed by indoor air pollution 63% and other risk factors are depicted in figure 3.

**Figure 3:** Risk factors for causing COPD

Average FEV1/FVC were 49.3 ± 14.59 , ranged from 19 to 70. The majority cases 28% had FEV1/FVC ratio in 61 to 70%, followed by 22% in 51 to 60% as shown in table 2.

Table 2: Distribution of cases according to FEV1/FVC

FEV1/FVC	No. of Cases	Percentage
≤20	2	2%
21-30	10	10%
31-40	18	18%
41-50	20	20%
51-60	22	22%
61-70	28	28%

Majority of cases i.e. 50% were moderate (50-79%) on spirometry, 38% were severe (30-50%) and 12% were very severe ($\leq 30\%$). Major ECG change seen was P wave height $>2.5\text{mm}$ in lead I in 28% and QRS axis $>90^\circ$ in 28% where as major chest X-ray finding seen was chronic bronchitis with emphysema in 66% and also major HRCT seen was 47% had air trapping, 26% had bronchial dilatation, 18% had emphysema, 1% had bullae and 8% were normal, (Table 3).

Table 3: ECG changes, chest xray and HRCT findings

ECG changes	No. of patients(%)
P wave height $>2.5\text{mm}$ in lead I	28 (28%)
QRS axis $>90^\circ$	28 (28%)
P wave axis $>90^\circ$	20 (20%)
R/S ratio in V5V6 <1	09 (9%)
R wave in V6 $<5\text{mm}$	08 (8%)
R wave V1 $>7\text{mm}$	04 (4%)
RRBB	03 (3%)
Chest X-ray	No. of Cases(%)
Chronic bronchitis with emphysema	66 (66%)
Chronic bronchitis	17 (17%)
Emphysema	09 (9%)
Normal	80 (8%)

HRCT	No. of Cases(%)
Air trapping	47 (47%)
Bronchial dilatation	26 (26%)
Emphysema	18 (18%)
Normal	08 (8%)
Bulae	01 (1%)

Association between spirometry severity and chest X-ray findings p value was 0.03, which shows statistical significance, (Table 4).

Table 4: Association between Spirometry severity and chest x-ray findings

Severity/CXR findings	Chronic bronchitis With emphysema	Chronic bronchitis	Emphysema	Normal
Moderate 50-79%	33	6	3	8
Severe 30-50%	24	8	6	0
Very severe <30%	09	3	0	0
Total	66	17	9	8

DISCUSSION

In the present study, most of the patients belonged to age group of 61–70 years with mean age of 62.17 ± 10.76 years which is similar to study done by Pazare *et al.*.... (65.7 ± 7.95)⁹ and Bakr *et al.*.... (65.08 ± 5.03)¹⁰. The peak incidence of COPD was found to be in the 5th and 6th decades of life. Also study found that the incidence of COPD was increasing in the age group more than 70 years, this can be attributed to environmental pollution, as well as smoking habit late in life. COPD was found to be more common in males (92%) than females (8%). The male preponderance may be due to higher incidence of smoking and outdoor activities in the male group. This finding is comparable with the previous studies^{9,11-13}. The most common symptoms were cough with expectoration (100%) followed by breathlessness (88%), wheezing (56%) and fever (11%). Similar findings reported in study done by Jimnaz *et al.*¹⁴. Pedal edema was present in 48% of cases. 28% cases had palor, 16% had clubbing, 6% had cyanosis and only 2% had icterus which is comparable with the study done by Gudagunti *et al.*¹⁵. The majority of cases (40%) had duration of illness 5 to 10 years as similar to Jimnaz *et al.*¹⁴. As reported in earlier studies¹⁴⁻¹⁶ in existing study also majority of cases were smokers (85%) and 50% had DM as co-morbidity. COPD is usually caused by cigarette smoking, though long-term exposure to other lung irritants, like second hand smoke, can also contribute to COPD. In current study, the common risk factors for COPD were smoking (88%), indoor air pollution (63%), and occupational exposure (22%). Thus the smoking being most common cause of development of COPD has been shown in other studies^{13, 17, and 18}. Few studies

reported that exposure to toxic gases in the workplace, grain dust in farms, and dust and fumes in factories, occupational exposures in coal Miners, hard-rock miners, tunnel workers, and concrete manufacturers was strongly associated with COPD^{19,20}. In NHANES III, Behrendt *et al.*²¹ identified several occupations like plastic, textile, rubber, and leather manufacture; transportation and trucking; manufacture of food products; automotive repair was associated with high prevalence of COPD. A clinical diagnosis of COPD should be considered in any patients who are having dyspnea, chronic cough and/or production of sputum, and a history of exposure to the risk factors for the disease. Spirometry is to be done to make the diagnosis in this clinical context; the presence of a post bronchodilator FEV1/FVC less than 0.70 confirms presence of persistent airflow limitation and thus COPD. The spirometric criterion for the airflow limitation remains a post-bronchodilator fixed ratio of FEV1/FVC less than 0.70. This criterion is simple, independent of reference values, has been used in numerous clinical trials thus forming the evidence base from which most of our treatment recommendations are given. Diagnostic simplicity and consistency are key for the busy non specialist clinician. Although post bronchodilator spirometry is necessary for the diagnosis and assessment of severity of COPD, degree of reversibility of airflow limitation (e.g.,measuring FEV1 before and after bronchodilator or corticosteroids) is no longer recommended^{22,23}. In present study majority cases 28% had FEV1/FVC ratio in 61 to 70%, followed by 22% in 51 to 60%, 20% in 41 to 50%, 18% in 31 to 40%, 10% in 21 to 30% and only 2% had less than 20% FEV1/FVC. Average FEV1/FVC were $49.3 \pm 14.59\%$ ranging from 19 to 70%. These findings are correlated with the study done by Gudagunti *et al.*¹⁵ and Bajpai *et al.*¹⁶. Severity of obstruction on spirometry show that maximum cases (50%) were moderate, 38% were severe and 12% were very severe which is comparable with the study done by Pazare *et al.*⁹. The major ECG change seen was P wave height >2.5mm in lead I in 28%, QRS axis >90° in 28%, P wave axis >90° in 20%, R/S ratio in V5V6 <1 in 9%, R wave in V6 <5mm in 8%, R wave V1 >7mm in 4% and RBBB in 3%. These findings are in accordance with the previous studies [9, 14, and 24]. Major chest X-ray finding seen was chronic bronchitis with emphysema in 66%, chronic bronchitis in 17%, emphysema in 9% and 8% had normal chest xray. In study by Jimnaz *et al.*¹⁴ 76% of patient's chest x-ray suggestive of chronic bronchitis with emphysema, 20% patient's chest x-ray suggestive of chronic bronchitis and 4% of patients had normal x-ray. Similar findings were seen in present study. HRCT chest detected

abnormality in 100% of cases and most common being air trapping (47%) followed by bronchial dilatation (26%), 18% had emphysema, 1% had bullae and 8% were normal. These results are similar to the study done by Pazare *et al.*⁹. The association between spirometry severity and chest X-ray findings p value was 0.03, which shows statistical significance.

CONCLUSION

Although smoking is commonest etiology of COPD, etiologies like exposure to indoor, outdoor smoke, environmental factors etc. are also equally common and important. Risk factors should be taken careof. Radiology, pulmonary function test and ECG changes are the various modalities which can be used for diagnosis purpose. Current techniques can offer detailed measures of lung structure and with newer modalities previously immeasurable things like regional lung function. Imaging in the context of clinical investigation may offer the ability to define more homogeneous subsets of subjects with COPD and to potentially provide an intermediate biomarker of disease progression in lieu of a declining FEV1. Computerized spirometry is very much a useful investigation in the management of chronic obstructive pulmonary disease. FEV1 values can be used as diagnostic, as well as to assess the severity of the disease. Further studies are required to explain the involved risk factors and their contributions to this disease to achieve reduction of the burden of COPD.

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