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Profile of COPD in relation to Lung Function & Smoking Status in a Tertiary Care Hospital in South India: A Cross Sectional Study

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Abstract
COPD (Chronic Obstructive Pulmonary disease),is a chronic lung disease which is effects the small airways leading to limitation of airflow, causing progressive respiratory symptoms like cough, sputum production, wheezing, shortness of breath. Most important risk factors are smoking, environmental pollution and biomass fuel exposure. Prevalence of COPD is on the rise. Early diagnosis and treatment is needed to improve the quality of life and prevent exacerbations. In this study we have classified COPD according to GOLD[2] (Global initiative for chronic Obstructive Lung Disease) guidelines and comparing the lung functions of different age groups with their pack years of smoking.
Keywords: *COPD, FEV1, FEV1/FVC, GOLD grading and assessment.*

Introduction

COPD is the third leading cause of death worldwide, responsible for 75.6% of chronic respiratory disease DALY'S (Disability adjusted life years).Number of cases in India increased from 28.1 million in 1990 to 55.3 million in 2016, an increase in prevalence from 3.3% to 4.2% [1].Prevention and control of the disease is the need of the hour. On average moderate to heavy smoker has a 15ml/yr larger decline of FEV1 than non smokers[12]. Assessment of COPD according to severity and GROUP A to D(GOLD) leads to proper management and prevention of complications in this study.

Material & Methods

The patients attending the department and having symptoms and radiology suggestive of COPD were subjected to the Spirometry test from a period of NOV 2015-OCT 2017 Out of these 236 cases were found to have COPD (GOLD Guidelines).

Inclusion Criteria

Age more than 40 yrs {study period November 2015 – October 2017}.

Clinical, radiological and pulmonary function test correlation for diagnosis according to **GOLD** criteria.

Exclusion Criteria: Other obstructive lung diseases like Asthma, Bronchiectasis, Asthma COPD overlap syndrome

Data Analysis

The following observations were made out of 236 cases 84% were males & 16% females.

Age Distribution

Most of the cases were in the age group of 61-70 years, followed by 27% in the 51-60 age brackets.

Risk Factors

74% of the cases had smoking history, 26% mostly females had exposure to biomass fuel with history of cooking using firewood. Other risk factors like Passive smoking, environmental pollution.

Table 1 FEV1 Staging

MILD,N=12 **FEV1>80%**	MODERATE,N=82 **FEV1 =50-79%**	SEVERE,N=93 **FEV1=30-49%**	VERY SEVERE,N=49 **FEV1 <30%**	TOTAL 236
12	82	93	49	
5%	34.74%	39.40%	20.76%	

Majority of the cases had **severe** airflow obstruction with FEV1 OF 30-49% OF predicted followed by moderate obstruction.

Severity Assessment according to Gold

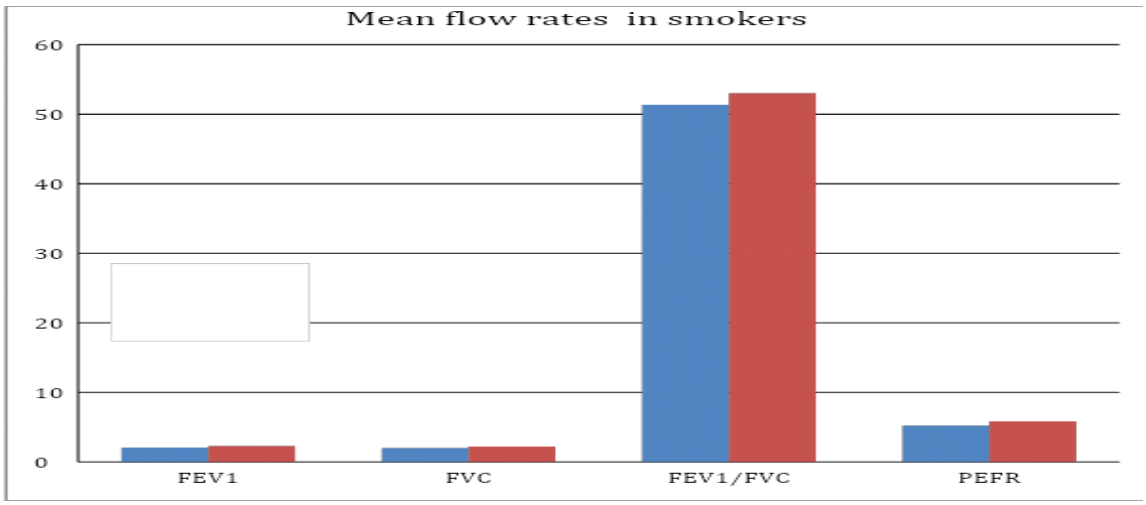
IN this study most of the patients belong to the **Group B & GROUP D** class signifies that more symptomatic patients seek hospital visit.

Specifically **GROUP D** about 91 OUT of 236 patients presented with exacerbation of COPD with ICU admission, significant risk of morbidity and mortality.

Mean Flow Rates:

Table 2 Mean Values

Test	Range	Mean
FVC (lt)	1.03-3.21	2.22 ±0.5
FEV1 (lt)	0.53-1.84	1.12 ±0.34
FEV1%	25.70-77.0	49.76 ± 14. 25
FEV1/FVC	21.5- 70	53.01 ± 14.22



About 55% had FEV1/FVC RATIO of 51 to 70%.

Table 3 FEV1/FVC %Values

FEV1/FVC	NUMBER	PERCENT	MEAN
61-70%	68	29	65.6
51-60%	62	26	55.9
41-50%	36	15	44.9
31-40%	47	20	37.12
21-30%	15	6	25.6
10-20%	8	3	5.21

Table 4 Pack Years of Smoking

PACK YEARS	NUMBER	% PERCENTAGE
1-10 YRS	6	2.54
11-20YS	28	11.86
21-30YRS	66	27.96
31-40YS	87	36.86
41-50YRS	24	10.16
>50	25	10.59

In this study 66.36% had 21-40 pack years of smoking history.

Significant decline in the lung function as the pack years of smoking increases.

Table 5 Comparison of Pack Years with Flow Values

Duration of smoking	Percent predicted (mean %)		
(pack yrs)	FEV1	FVC	PEFR
1-10 yrs	77.4	81	75.6
11-20yrs	70.6	73.6	64.6
21-30	68.3	72.3	63.6
31-40	64	70.7	60.5
41-50	59.9	68.3	58.9
>50 yrs	58.25	65.8	56.75

Results

In the present study Mean age was 63.16±10.45.

Male predominant 84% and 74% smokers.

Common in Non- smoking females exposed to biomass fuel.

Present study shows majority of patients **39.40%** had **FEV1** between 30-49% (GOLD)Mean 49%, belong to **Severe** degree of airflow obstruction.

Most of the patients belong to GROUP D (N=91,38.55%) and GROUP B(N=68,28.81%),GROUP D+GROUP B(N=159, **67.37%)** implies that more symptomatic patients seek medical attention.

In this study GOLD CLASSIFICATION GROUP C (N=45) and GROUP D (N=91),TOTAL N=136, **57.62%** patients had increased risk of exacerbations.

We recommend that COPD patients should seek medical care earlier with regular follow up, smoking cessation, Pneumococcal and H. influenza vaccination and pulmonary rehabilitation significantly improves the quality of life.

- The actual values of FVC (2.22 ltrs± 0.5), FEV1 (1.12 ltrs± 0.34),FEV1% mean 49% ratio of FEV1/ FVC Mean 53% and PEFR are decreased more with increase in duration of smoking and increase in number of cigarettes per day. Thus showing a dose response relationship.

Discussion

In this study patients attending the department > 40yrs {from November 2015 – October 2017} were taken, COPD is detected based on history, physical examination, radiological picture and spirometry (GOLD guidelines) about **236** cases were studied.

COPD is a disease of late adulthood. As the age advances the lung function (FEV1) declines and

other risk factors add to the disease process. In the present study mean age was 63.16±10.45, which is compared to Gareth james et al[16] mean age 71yrs, Holm KE[17] study mean age 59.9 yrs and S.M.Afonsa[18] mean age group 40-59 yrs.

COPD is a male dominant disease, the high prevalence in males which is due to higher prevalence of smoking. Present study 74% are male and 26% females. All female non- smokers had history of cooking with burning wood or cow dung (Biomass fuel)[14].

Present study consists of mean value of FEV1 1.12(ltrs) ±0.34, FVC (ltrs) 2.22 ± 0.50 and FEV1/FVC% 53.01% ± 14.22. According to GOLD criteria[2] majority of the patients in the present study belong to moderate to severe airflow obstruction. Most of the patients belonged to the Group D (GOLD CLASSIFICATION) followed by GROUP B, suggest that most COPD patients seek medical attention when there are more symptomatic and in advanced stage of disease, leading to increased risk of complications like recurrent exacerbations, respiratory failure, cardiovascular events.

Present study shows **39.40%** of patients had **FEV1** between 30-49%(GOLD)stage3, majority of the patient in present study belong to **severe** degree of airflow obstruction, which was in **contrast** to Niranjan Mambally et al[15] most had stage 2 GOLD disease. Comparable to Maria Jose et al[19] mean FEV1 41%. Mean flow rates of smokers were, baseline FEV1 2.07±0.25 & post dilator was 2.3±0.35; FVC, 1.99± 2.53 was the baseline rate and 2.22± 0.5 post dilator. PEF was 5.21±3.51 against 5.83±0.81 post dilator. FEV1/FVC was 51.35±3.42 while post dilator was 53.01 ± 14.2.

In our study there was a statistically significant decrease in the levels of FEV1, FVC, FEV1/FVC and PEFR[TABLE 5] more with an increase in duration of smoking and also with the increase in the number of cigarettes smoked per day i.e. pack years. Similar findings were also reported in studies, Miller A et al[29], & M hase VT et al[32].

Our findings suggest a decrease in lung functions in the first five years of smoking and is similar to the finding of Camilli AE et al[25] suggesting that the earliest effects of smoking are relatively rapid. As shown by other studies such as Tashkin DP et al[24], Dockery DW et al[26], and Gorecka et al[34], that quitting smoking improves the lung function. Hence the inflammatory changes in small airways often reverse with cessation of smoking.

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Abbreviations

GOLD- Global initiative of chronic Obstructive Lung Disease
FEV1- Forced expiratory volume in first second
FVC-Forced vital capacity
PEFR-Peak expiratory flow rate
CAT score-COPD Assessment test
MMRC-Modified medical research council score