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A Clinico-demographic Study on Chronic Obstructive Pulmonary Disease Patients of Central India and Comparison between smoker v/s non-smokers COPD Patients.

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Abstract

Introduction: The clinico-demographic profile of COPD patients encompasses a wide range of variables, including age, gender, socioeconomic status, comorbidities, and symptomatology. Cigarette smoking is the primary risk factor contributing to the development of COPD. **Aim and objectives:** To study clinico- demographic and lung spirometry profile between non-smoker and smoker COPD patients. **Material and methods:** This is a cross-sectional observational study, conducted in 200 clinically diagnosed COPD patients attending the pulmonary medicine department at PCMS & RC between the November 2022 to February 2024; after getting approval from the institutional ethical committee. All the data analysis was performed using IBM SPSS ver. 25 software. **Observations & results:** The mean ($\pm$ SD) age of total 200 patients were 58.43 ± 10.07 years, of these maximum 35% (71) patients were belonged to 51 – 60 years age group. 67% were smokers and 33% were non-smokers, most of COPD patients (35%) were farmers and most 58.5% were resides in rural areas. Smokers showing statistically significant more shortness of breath compared to non-smokers. **Conclusion:** We concluded that COPD is more common in smokers, in non-smokers biofuel and second-hand smoke are key risk factors, especially in rural areas and this is the highlighting need for public health interventions.

Key Words: Chronic obstructive pulmonary disease, mMRC-Dyspnea grades, Smokers,

Introduction

Chronic obstructive pulmonary disease (COPD) is a common and treatable disease characterized by progressive airflow limitation and tissue destruction. It is associated with structural lung changes due to chronic inflammation from prolonged exposure to noxious particles or gases most commonly cigarette smoke. Chronic inflammation causes airway narrowing and decreased lung recoil. The disease often presents with symptoms of cough, dyspnea, and sputum production. Symptoms can range from being asymptomatic to respiratory failure.¹ Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality worldwide, primarily caused by cigarette smoking. This debilitating disease is characterized by chronic inflammation, irreversible airflow obstruction, and significant lung structural changes.² Globally, around 50% of COPD cases are linked to smoking, with 10%-12% of diagnosed individuals having never smoked.³

COPD is characterized by persistent airflow obstruction, with cigarette smoking as the primary risk factor, accelerating lung function decline.⁴ Interestingly, non-smoking COPD prevalence is higher in developing countries than in developed nations, suggesting that factors beyond smoking—such as indoor/outdoor pollution, infections, and occupational exposures—may play a more significant role in COPD development in this regions.⁵ Non-smoker COPD patients often differ from smokers in terms of age, gender, and comorbidities. They tend to be older at diagnosis, with a higher prevalence among females.⁶ The clinico-demographic profile of COPD patients encompasses a wide range of variables, including age, gender, socioeconomic status, comorbidities, and symptomatology. Non-smokers may also have more cardiovascular comorbidities and a greater genetic predisposition to COPD.⁷ Lung spirometry is key for diagnosing and monitoring COPD, revealing important differences between non-smoker and smoker patients.⁸ Personalized treatment strategies based on factors like smoking history, age, and comorbidities, are essential for improving outcomes. Non-pharmacological interventions such as smoking cessation, pulmonary rehabilitation, and vaccination are important to prevent exacerbations and progression of disease. Pharmacological treatments, including bronchodilators

and anti-inflammatory agents, should be tailored to address the specific mechanisms of disease progression in each patient.

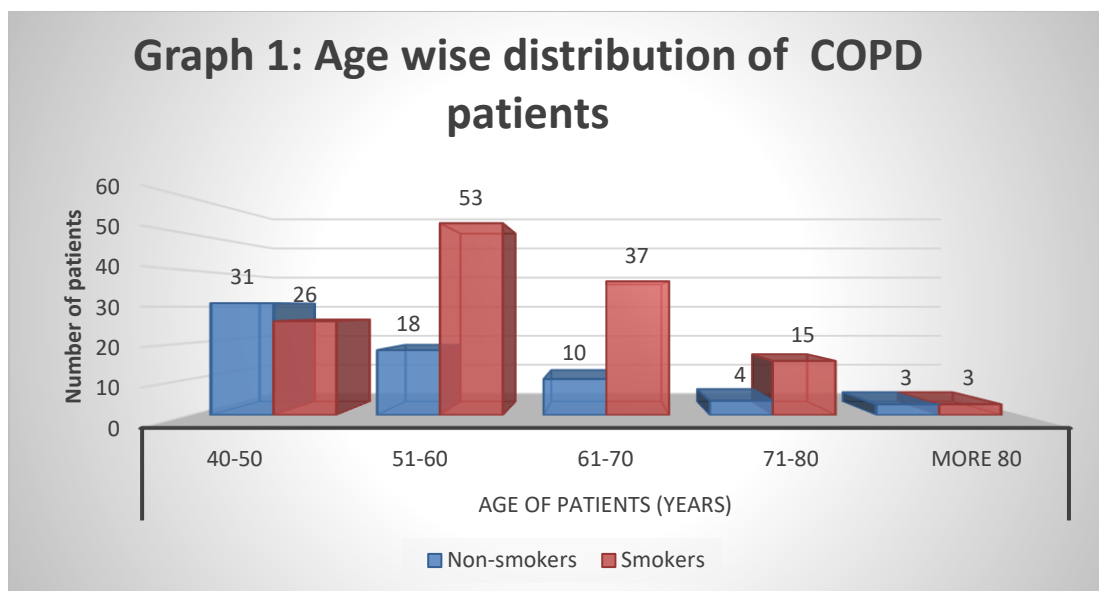
Materials and Methods

This cross-sectional observational study was conducted from November 2022 to February 2024, involving 200 clinically diagnosed COPD patients attending the Pulmonary Medicine Department at PCMS & RC, with approval from the Institutional Ethical Committee. Patients aged >18 years, both outpatients and inpatients, with a known COPD diagnosis or newly diagnosed based on clinical history, spirometry and chest X-ray were included. Detailed medical history and previous exposures were recorded. **Smoker-COPD:** Defined as tobacco smokers with ≥ 10 pack-years of cigarette or bidi use, no other respiratory diseases (confirmed by history, clinical exam, and chest X-ray), and post-bronchodilator FEV1/FVC ratio <70% and FEV1 <80% predicted, exhibiting irreversible airflow obstruction. **Non-Smoker COPD:** Defined as individuals exposed to biomass smoke for ≥ 2 hours/day for 20 years or to occupational risk factors, with no smoking history in the past year, no other respiratory diseases (confirmed by history, clinical exam, and chest X-ray), and similar spirometry findings as Smoker-COPD, showing irreversible airflow obstruction. **Statistical Analysis:** Data were analyzed using IBM SPSS ver. 25. Quantitative data were presented as mean $\pm$ standard deviation, and categorical data as frequencies and percentages. The Chi-square test was used for categorical variables, while the independent t-test was used for comparing means. A p-value < 0.05 was considered statistically significant.

Observations & results

This observational study was conducted in the Department of Pulmonary Medicine at PCMS & RC, Bhopal from November 2022 to February 2024. Total 200 clinically diagnosed COPD patients were involved in the study and following observations were made.

Graph 1: Age wise distribution of COPD patients.



This graph-1 showed the mean ($\pm$ SD) age of total 200 patients were 58.43 ± 10.07 years, of these maximum 35% (71) patients were belonged to 51 – 60 years age group in overall and 39.5% in smokers. However the maximum (46.9%) patients in non-smokers were younger; belong to 40-50 years of age group. The mean age for smokers were significantly ($p < 0.009$) higher (59.73 ± 9.2 years) compared to non-smokers (55.77 ± 11.11 years).

Table 1: Smoking Status and Gender wise distribution of COPD patients

Sr. No	Smoking Status and Gender	COPD patients				Total COPD Patients		P Value
		Non-smokers		Smokers		Number	%	
		Number	%	Number	%			
1	Males	19	12.66	131	87.33	150	100	<0.001
2	Females	47	94.0	3	6.0	50	100	
Grand Total		66	33.0	134	67.0	200	100	

This table-1 showed that, of total 200 COPD patients, 67% were smokers (87.33% were males and 6.0 % were females) and 33% were non-smokers (94% were females and 12.66% were males).

Table 2: Occupation wise distribution of COPD patients

Sr · N o	Occupation	COPD patients				Total COPD Patients		p- value
		Non-smokers		Smokers		Number	%	
		Numbe r	%	Number	%			
1	Broom Maker	0	0	10	7.4	10	5.0	<0.001
2	Farmer	3	4.5	67	50.0	70	35.0	
3	Grain worker	6	9.0	5	3.7	11	5.5	
4	House wife	47	71.1	2	1.4	49	24.5	
5	Shopkeeper	8	12.1	19	14.1	27	13.5	
6	Wage work	2	3.0	31	23.1	33	16.5	
Grand Total		66	100	134	100	200	100	

This table-2 showed that, most of COPD patients (35%) were farmers and least common (5%) were belong to broom makers. Non-smokers were predominantly (71%) housewives, while smokers were mainly (50%) farmers and (23%) wage workers. Smokers had significantly ($p < 0.001$) more COPD compare to non-smokers.

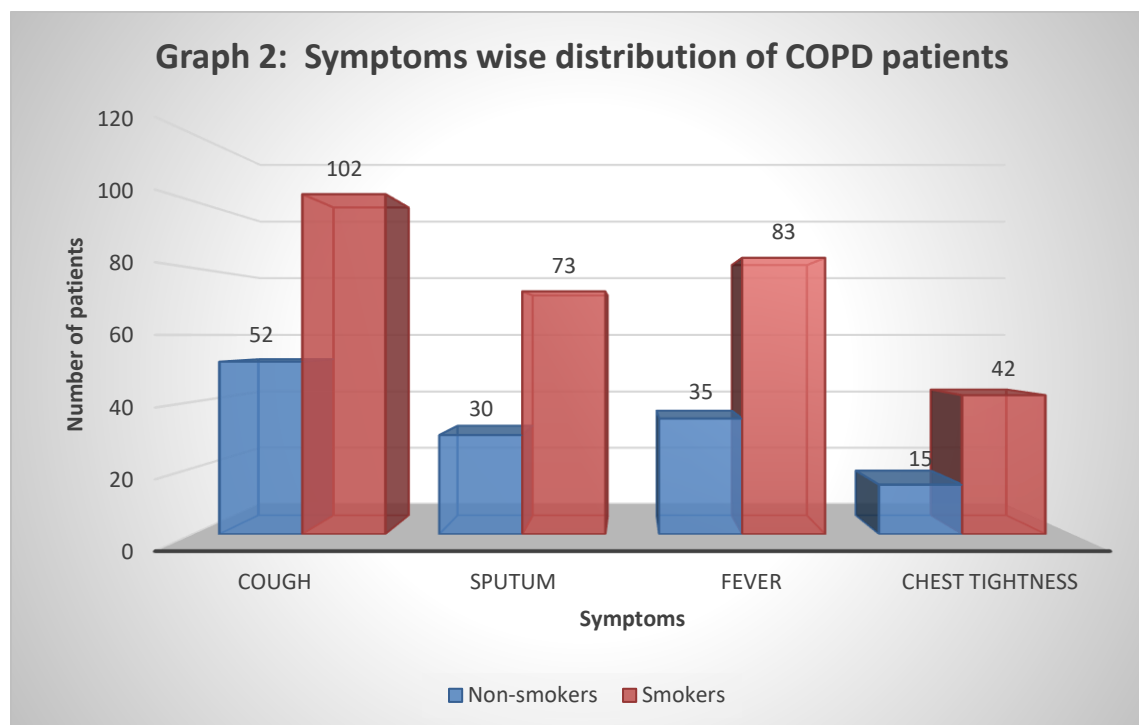
Table 3: Residing areas and Educational status wise distribution of COPD patients

Sr. No .	Residing area and Educational status		COPD patients				Total COPD Patients		p-value
			Non-smokers		Smokers				
			Number	%	Number	%	Number	%	
1	Residing Areas	Rural	20	33.3	97	72.3	117	58.5	<0.001
		Urban	46	69.6	37	27.6	83	41.5	
Grand Total			66	100	134	100	200	100	
2	Education Status	Illiterate	29	43.9	108	80.5	137	68.5	<0.001
		Literate	37	56.0	26	19.4	63	31.5	
Grand Total			66	100	134	100	200	100	

This table-3 showed that most 58.5% patients were resides in rural areas (72.4% smokers and 33.3% non-smokers). And 41.5% were resided in urban areas (69.6% non-smokers and 27.6% smokers). Total 68.5% were illiterate (43.9% non-smokers and 80.5% smokers) and 31.5% were

literate (56.0% non-smokers and 19.4% smokers). Smokers, significantly ($p < 0.001$) resides in rural areas and they were significantly ($p < 0.001$) illiterate compare to non-smokers.

Graph 2: Symptoms wise distribution of COPD patients.



This Graph-2 compares the symptoms between smokers and nonsmokers, the most common were cough 35%, followed by fever 27.2%, sputum production 24%, and chest tightness 13.1%. Of these symptoms; all symptoms; cough ($p<0.034$), fever ($p<0.011$), sputum production ($p<0.0212$) and chest tightness ($p<0.012$) were significantly higher in smokers compare to non-smoker COPD patients.

Table 4: Comparing Shortness of breath as per smoking status in COPD patients.

Sr. No	Shortness of breath	COPD patients				Total COPD patients		p - value
		Non-smokers		Smokers				
		Number	%	Number	%	Number	%	
1	mMRC Grade 1	14	21.2	6	4.4	20	10	<0.001
2	mMRC Grade 2	40	60.6	86	64.1	126	63.0	
3	mMRC Grade 3	8	12.1	32	23.8	40	20.0	
4	mMRC Grade 4	4	6.0	10	7.4	14	7.0	
Grand Total		66	100	134	100	200	100	

This table-4 showed that, of total patients; maximum 63.0% were belonging to mMRC Grade-2, (60.6% in non-smokers and 64.1% in smokers group). To compares the severity of shortness of breath (using mMRC grades) between non-smoker and smoker, smokers showing statistically significant more shortness of breath compared to non-smokers.

Table 5: Comparison of mean CAT scores among smoker and nonsmoker COPD patients.

Sr. No	Groups	Mean score	CAT	Std. Deviation	p- value
1	Non-smokers	29.17		4.508	<0.001
2	Smokers	31.43		4.204	

This table-5 showed that smokers had significantly higher CAT scores, indicating more severe COPD symptoms and a greater impact on daily life in smokers compared to non-smokers.

Discussion

In our study, 67% of COPD patients were smokers, and 33% were non-smokers, highlighting a strong link between smoking and COPD. This aligns with findings by Bajpai et al. (2019),⁶ Sinha et al. (2017),⁹ and Zhang et al (2014),¹⁰ all of whom reported a high prevalence of smoking among COPD patients. The mean age of COPD patients in our study was 58.43 years, with smokers being older (59.73 years) than non-smokers (55.77 years). This aligns with Bajpai et al. (2019),⁶ who found smokers had a higher mean age (59.29 years), and Sinha et al. (2017),⁹ who noted an average age of 57.13 years, highlighting the impact of long-term exposure to smoking and pollutants. The higher mean age among smokers suggests that prolonged tobacco exposure accelerates COPD onset and severity, leading to earlier diagnosis and more severe progression. Alamgir et al. (2021)¹¹ found significantly lower FEV1 values in smokers, indicating worse lung function and more advanced disease in older smokers. Regarding occupation, non-smokers in our study were predominantly housewives (71.2%), while smokers were mainly farmers and wage workers. This indicates that occupational factors may influence smoking habits and COPD risk. Similar trends were noted by Zhang et al.(2014)¹⁰ and Bajpai et al. (2019),⁶ who found smokers with COPD were mostly engaged in labor-intensive occupations. In our study, 72.4% of smokers lived in rural areas, while 69.7% of non-smokers were in urban areas, aligning with findings by Sze et al. (2022)¹² and Alamgir et al. (2021).¹¹ Rural smoking prevalence may be linked to limited access to cessation programs and higher biomass fuel exposure, contributing to COPD in non-smokers. Regarding education, most smokers were illiterate (80.6%), while 56.1% of non-smokers were literate,

suggesting that lower education levels are associated with higher smoking rates. This is supported by Sinha et al. (2017)⁹ and Bajpai et al. (2019)⁶, who emphasized the role of education in smoking prevention and COPD management. Most of the smokers with COPD in our study were belonged to lower socioeconomic classes, while non-smokers were from higher classes, suggesting that lower socioeconomic status may influence smoking habits and increase COPD risk. Smokers experienced more severe symptoms (cough, sputum, fever, chest tightness), consistent with Bajpai et al. (2019)⁶ and Sinha et al. (2017)⁹, who linked these symptoms to the irritant effects of tobacco smoke. Smokers also had higher mMRC grades, reflecting worse dyspnea and more advanced disease, as observed in previous studies. In our study, smokers had higher mean CAT scores (31.43 vs. 29.17), indicating more severe symptoms and greater daily impact. This is consistent with Ji et al. (2018),¹³ who found more emphysema in smokers, and Bajpai et al. (2019),⁶ who linked smoking to worse airflow limitation. Ojuawo et al. (2021)¹⁴ and Salvi et al. (2020)¹⁵ also reported lower disease severity in non-smokers. Ji et al. (2020),¹³ who found more emphysema and airway thickening in smokers, and Bajpai et al. (2019)⁶ who reported more severe airflow limitation in smokers, with fewer non-smokers in advanced stages. In our study, most non-smoker COPD patients (71.2%) were exposed to biofuel, followed by second-hand smoke and other factors. Ji et al. (2018)¹³ found that biomass smoke exposure in non-smokers led to lung changes similar to tobacco smoke, causing emphysema and airway obstruction. Bajpai et al. (2019)⁶ also identified biomass smoke as the primary risk factor for non-smoker COPD, followed by asthma and childhood respiratory infections.

Conclusion

In our study we found that COPD is more common in smokers, in non-smokers biofuel and second-hand smoke are key risk factors, especially in rural areas and this is the highlighting need for public health interventions. Non-smokers with COPD typically have less severe symptoms and better spirometry than smokers. This emphasizes the impact of smoking on disease progression and the need for smoking cessation programs. Public health policies need to focus on reducing exposure to all types of smoke, biofuel and second-hand smoke for lowering COPD rates and improving outcomes.

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