

Chronic Obstructive Pulmonary Disease (COPD) in Non-Smokers Attending a Tertiary Care Hospital: A Clinical Study

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Abstract:

Background: Globally, Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of death. The purpose of this study is to determine the clinical characteristics of COPD in nonsmokers as well as additional risk factors for the disease outside smoking.

Method: Data was collected using a pre-tested proforma that met the study's objectives. A thorough history was obtained, a clinical examination was performed, and any required research was done. Categorical data was expressed as a number and percentage (%), whereas continuous data was expressed as Mean±SD.

Results: The majority of the non-smoking COPD patients in the current study were found to be older in age. The patients in this study had an average age of 55.06±8.87 years. The study sample consisted of 64% study subjects under 40, 30% study subjects between 40 and 79, and 0% study subjects over 80. 68% of the population is female, with a male to female ratio of 1: 2.125.

Conclusion: The majority of participants in this study on COPD in nonsmokers were female. Sputum production and coughing were the most prevalent clinical symptoms. The two most prevalent risk variables were the use of biomass fuel and exposure to ambient tobacco smoke. The majority of the patients had a rural upbringing. The majority of patients had milder forms of the illness when they first arrived.

Keywords: COPD; Non-smoker; Cough; Biomass; Smoking.

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Introduction

The third most common cause of death worldwide is chronic obstructive pulmonary disease (COPD) [1]. In Southern Asia, it is ranked fifth [2]. According to the 2013 Global Burden of Disease Study, COPD affects over 300 million people worldwide [3]. The type of cooking appliance used has a big influence on indoor air pollution. Four different kinds of cooking appliances are frequently utilized in India. The first four are the kerosene stove (wick type or pressure type); the second is the coal-lighted "angithi"; the third is the gas stove that runs on liquefied petroleum gas (LPG); and the fourth is the "chulla," which uses biomass fuels such as dried manure, crop remnants, and agricultural wastes [4].

It is commonly known that all types of cooking fuels release gases that irritate the respiratory system, such as sulfur dioxide, oxides of nitrogen, and unburned hydrocarbons, or soot. Particles of soot from burning firewood, such as chulla, may pose a greater risk of producing chronic bronchitis and obstructing airways. Researchers from our nation have reported that the prevalence of chronic bron-

chitis in women who do not smoke ranges from 0.44 to 4.96 percent [5]. Approximately 3,701 women were studied to determine how different respiratory symptoms could be caused by home cooking fuels. Among them, 3,608 were non-smoking females who utilized one of the four types of cooking fuels: biomass, LPG, kerosene, or mixed fuels. In 13% of cases, respiratory problems were reported. Those who used mixed fuels experienced higher rates of respiratory problems (16.7%), followed by those who used biomass (12.6%) and stoves (11.4%).

Large population-centered studies are providing more and more evidence that a significant fraction of COPD cases in a community can be linked to exposure to noxious gases or vapours, dusts, or fumes. Industries like construction, plastics, rubber, fabric, and leather manufacture are linked to increased risk. Among those who had never smoked, the overall risk was 31%. Because passive smoking and environmental tobacco exposure have such negative impacts on public health, they are

receiving increased attention. Combinations of inhaled mainstream and side stream tobacco smoke make up environmental tobacco smoke. Because side stream smoke burns at a lower temperature than mainstream smoke, it contains higher quantities of benzene, ammonia, nicotine, carbon monoxide, and several carcinogens, including 2-naphthylamine, 4-aminobiphenyl, n-nitrosamine, benza-anthracene, and benzopyrene[8].

Based on biochemical indicators, such as cotinine and nicotine levels in the urine and saliva, the level of exposure has been compared to 0.1–2 cigarettes a day. Because ETS is so common in homes, workplaces, and public settings, exposure to it is practically inevitable.

Environmental smoke usually bothers women far more than it does men. It provides supporting evidence for the serious health risks associated with second-hand smoke.

Males were more likely to be exposed to ETS outside (53% versus 7%), whereas females were more likely to be exposed at home (31% versus 19%). Compared to men (21.6%), women (37.7%) experienced higher symptoms associated with ETS.

Materials and Methods

Pre- and post-bronchodilator pulmonary function tests were performed on all nonsmoking patients who had been admitted to the medical wards of Darbhanga Medical College & Hospital, Laheriasarai, Bihar, or who had a history of cough, sputum, dyspnea, or wheezing lasting longer than three months. This study covered patients whose post-

bronchodilator FEV1/FVC was less than 0.7. The time frame for this research was October 2014–September 2015. This cross-sectional study included a total of 100 non-smoking patients with post-bronchodilator FEV1/FVC < 0.7. Patients with bronchial asthma, pulmonary tuberculosis (past or present), interstitial lung disease, acute left ventricular failure, and pulmonary edema, bronchiectasis, and chest wall deformities were not included in the study.

Data was collected using a pre-tested proforma that met the study's objectives. A thorough history was obtained, a clinical examination was performed, and any required research was done.

Lung function testing were conducted using an automated spirometer. The exam resulted in three acceptable attempts, with the best attempt being taken into account. A metered dose inhaler was used to achieve bronchodilation with 400 µg of salbutamol, and the test was repeated after 15 minutes. A chest X-ray postero-anterior view, urine analysis, ECG, serum creatinine, blood urea, random blood sugar, sputum for gram stain and acid fast stain, and other routine tests were also performed.

To assess the data, descriptive statistics were applied. Categorical data was expressed as a number and percentage (%), whereas continuous data was expressed as Mean±SD.

Results

100 cases were studied and the following observations were made.

Table 1: Age and sex distribution

Age Group (years)	Males	Females	Total	Percentage
31-40	4	2	6	6%
41-50	6	14	20	20%
51-60	14	30	44	44%
61-70	6	18	24	24%
71-80	2	4	6	6%
Total	32	68	100	100%

The patients under study ranged in age from 37 to 75 years old, with a mean age of 55.06±8.87 years. The majority of the patients were in the 51–60 age range. 32 patients were male and 68 patients were female out of the 100 cases that were examined. Women made up the majority, accounting for 68%.

Table 2: Symptoms

Symptoms	Number of patients	Percentage
Cough	100	100%
Sputum	100	100%
Breathlessness	72	72%
Wheezing	24	24%
Fatigue	20	20%
Swelling of lower limbs	16	16%
Weight loss	16	16%
Fever	12	12%
Chest pain	4	4%

Cough and sputum were present in all of the patients while breathlessness was present in 72%, wheezing in 24%, fatigue in 20%, weight loss in 16%, swelling of lower limbs in 16%, fever in 12% and chest pain in 4% of the patients.

Table 3A: Biomass fuel exposure

Biomass full exposure	Number of patients	Percentage
No exposure	14	14%
Exposure	86	86%

Out of 100 patients, 86 patients (86%) gave history of biomass fuel usage and exposure. All 14 patients (14%) who did not have biomass fuel exposure were males. 24 patients (24%) gave history of exposure <6 hours/day, 62 patients (62%) gave history of exposure \geq 6 hours/day. Fourteen patients (14%) gave duration of exposure for

biomass fuel for <10 years whereas 36 patients (72%) gave history of duration of exposure for biomass fuel for \geq 10 years. Most of the patients with biomass exposure (46.51%) belonged to GOLD stage 2. About 25.58% belonged to stage 1. Around 23.25% belonged to stage 3 and only 4.65% belonged to stage 4.

Table 3B: Nature of fuel used

Fuelused	Number of patients	Percentage
No exposure	14	14%
Firewood	66	66%
Firewood +Cow dung	20	20%
Total	100	100%

Thirty-three patients (66%) gave history of firewood usage and ten patients (20%) gave history of firewood and cow dung usage. 100 patients (100%). Most of the patients, i.e. 94 patients (94%) were exposed for >3 hours, only 6 patients (6%) were exposed for <3 hours in a day. Forty two patients (42%) patients were exposed for \leq 10 years and 58 patients (58%) for >10 years.

Table 4: Environmental tobacco smoke exposure

ETS exposure	Number of patients	Percentage
ETS exposure present	100	100%
No exposure	0	0

History of exposure to environmental tobacco smoke was present in all.

Table 5: Occupational exposure

Occupational exposure	Number of patients	Percentage
No exposure	64	64%
Dust	20	20%
Husk	6	6%
Dust+Husk	2	2%
Coaldust	4	4%
Textile mill	2	2%
Total	100	100%

Out of 100 patients, only 36 patients (36%) gave history of occupational exposure, 20 patients (20%) gave history of exposure to dust, 2 patients (2%) gave history of exposure to dust and husk, 6 patients (6%) gave history of exposure to husk, 4 patients (4%) gave history of exposure to coal dust and 2 patients (2%) gave history of exposure to textile mill dust. Six patients (6%) gave history of exposure for \leq 10 years and 30 patients (30%) gave history of duration of exposure for >10 years.

Table 6: Place of living

Place of living	Number of patients	Percentage
Urban	18	18%
Rural	82	82%
Total	100	100%

Eighty two patients (82%) were living in rural area whereas 18 patients (18%) were living in urban area.

Table 7: Exposure to air pollution

Pollution	Number of patients	Percentage
Absent	80	80%
Present	20	20%

20 percent of the patients gave history of exposure to air pollution.

Table 8: Clinical examination findings

Clinical features	Number of patients	Percentage
Raised JVP	14	14%
Pedal edema	16	16%
Barrel chest	38	38%
Decreased movements	60	60%
Rhonchi	44	44%
Crepitations	92	92%

Of the 100 patients, crepitations were noted in 92% of patients. The next most common signs were decreased chest movements (60%) and Rhonchi (44%). Raised JVP was present in 14% and pedal edema in 16% respectively.

Table 9: Chest X-ray findings

Chest X-ray findings	Numbers of patients	Percentage
Chronic bronchitis	24	24%
Emphysema	32	32%
Chronicbronchitis+Emphysema	12	12%
Normal	32	32%
Total	100	100%

Chest X-ray showed chronic bronchitis in 24 patients (24%), chronic bronchitis with emphysema in 12 patients (12%), and emphysema in 32 patients (32%) and was normal in 32 patients (32%).

Discussion

This study shows the clinical characteristics and different risk variables of nonsmokers with COPD. It was found in the current study that the majority of nonsmokers had COPD. The patients were of an older age group; their mean age was 55.06±8.87 years. 64% of study participants were under 40, 30% were between 40 and 79, and 0% were above 80 years old.

The age distribution in this study is similar to that of Shammem et al.'s [6] study, which found that the distributions for age groups <40, 10-59, 60-79, and ≥80 were, respectively, 7.3%, 56.3%, 33.3%, and 3.1%. The majority of research participants in this study were in the 40–59 age range, which was similar to that of Shameem et al [6] study. With a male to female ratio of 1:2.125, women make up 68% of the participants in this study. Of the participants in Shameem et al. [6], 36.5% were men and 63.5% were women.

Cough and expectoration were the most common symptoms in the current investigation. Every patient had disclosed a history of expectoration and cough. The next most common symptoms were wheezing (24%), and dyspnea (72%). Crepitations were the most frequently seen symptom in this study, occurring in 92% of the participants. Reduced chest motions, observed in 60% of cases, were the next common indication. In 44% of cases, rhonchi were observed, and in 38%, barrel chests were. Raised JVP and pedal edema were only observed in 16% and 14% of cases, respectively.

In the current study, all participants were exposed to environmental tobacco smoke at work or at home, at 100%. Similar investigations by Mahesh et al. [8] and Berglund et al. [9] found that the exposure was 60.86% and 62.58%, respectively. A higher lifetime cumulative exposure at home and at work was linked to an increased risk of COPD. For work exposure, the population's attributable risk was 7%, while for home exposure, it was 11%. [10] Of those exposed, 36% were at work. It was 24% in Shameem et al. [6]

A history of exposure to biomass fuels was found in 86% of the patients. There seems to be a link between exposure to biomass fuel and a higher incidence of COPD. Using GOLD severity staging and biomass exposure as a guide, the distribution of patients reveals that 25.58% of those with biomass exposure had mild disease, 46.51% had moderate disease, 23.25% had severe disease, and 4.65% had very severe disease. It demonstrates that the majority of research participants in the current study who were exposed to biomass had moderate to severe disease types. This was similar to the study that was previously mentioned. It was found that the longer biomass smoke exposure, the higher the risk of COPD.

The present study history of exposure to outdoor air pollution was 20%, which is similar to the findings of Tarik, Mahmood et al [11] investigation. The use of fossil fuels, mostly in automobiles, is linked to deterioration in respiratory health. [13] The present study 82% subject population had a rural background, which was similar to the 72.73% of individuals in Goel et al. [12] study. Large sample size, population-based studies are further required to document the exact prevalence of risk factors, especially in the rural region. Other factors associated with COPD include exposure to outdoor air pollution, transportation and trucking, farming,

and livestock. All of these factors need to be reduced in order to prevent the development of COPD, reduce morbidity and mortality associated with it, and improve the quality of life for these individuals.

The patients in this study were distributed as follows: mild patients made up 30%, moderate patients made up 46%, severe patients made up 20%, and extremely severe patients made up 4%. More patients with mild to moderate illness presented in this study.

Conclusion

The majority of participants in this study on COPD in nonsmokers were female. Sputum production and coughing were the most prevalent clinical symptoms. The two most prevalent risk variables were the use of biomass fuel and exposure to ambient tobacco smoke. The majority of the patients had a rural upbringing. The majority of patients had milder forms of the illness when they first arrived.

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