**International Journal of Immunology Sciences**
**Online ISSN: 2664-8490, Print ISSN: 2664-8482**
**Received: 01-03-2020; Accepted: 15-03-2020; Published: 05-04-2020**
**www.immunologyjournal.net**
**Volume 2; Issue 1; 2020; Page No. 01-04**

# Study of chronic obstructive pulmonary disease in non-smokers attending a tertiary care hospital of Bhuj, Kutch

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**DOI:** https://doi.org/10.33545/26648482.2020.v2.i1a.2

**Abstract**

**Background and Aim:** According to World Health Organization, globally chronic obstructive pulmonary disease (COPD) is a leading cause of mortality and morbidity. The present study was done: to study the clinical profile of COPD in non-smokers and to identify the other risk factors (other than smoking) of COPD.

**Material and Methods**: Eighty patients who were non-smokers and presented with history of cough, sputum, breathlessness or wheezing of more than 3 months duration to the medical outpatient department or admitted in medical wards of Gujarat Adani Institute of Medical Science, Bhuj, Kutch were subjected to pre and post bronchodilator pulmonary function testing. Data was collected meeting the objectives of the study with a pre-tested proforma. Detailed history was taken, clinical examination was done and necessary investigations were carried out. A computerized spirometer was used to perform lung function tests. Three satisfactory efforts from the test were recorded and the best effort among them was considered. Bronchodilation was done using 400 µg of inhaled salbutamol using a metered dose inhaler and test was repeated after 15 minutes.

**Results:** Cough and sputum were present in all of the patients while breathlessness was present in 62.5%, wheezing in 20%, fatigue in 17.5%, weight loss in 12.5%, swelling of lower limbs in 13.7%, fever in 11.2% and chest pain in 6.2% of the patients. Out of 80 patients, only 22 patients gave history of occupational exposure, 15 patients gave history of exposure to dust, 4 patient gave history of exposure to dust and husk, 4 patients gave history of exposure to husk, 6 patients gave history of exposure to coal dust and 5 patient gave history of exposure to textile mill dust. 20 percent of the patients gave history of exposure to air pollution.

**Conclusion**: On the basis of these findings, it can be concluded that nonsmokers contribute a significant proportion of COPD patients. Multiple risk factors other than smoking also play a major role in development of COPD, particularly exposure to biomass smoke, treated pulmonary tuberculosis, and long standing asthma. Other nonsmoking risk factors are occupational exposure, exposure to outdoor air pollution, lower respiratory tract infection during childhood and low socioeconomic status.

**Keywords:** breathlessness, chronic obstructive pulmonary disease, coal dust, occupational exposure

## 1. Introduction

According to World Health Organization, globally chronic obstructive pulmonary disease (COPD) is a leading cause of mortality and morbidity. [1]. COPD is a chronic respiratory disease characterized by a waning in lung function over a period of time, along with respiratory symptoms, primarily dyspnea, cough, and sputum production. [2]. Consequently, COPD impacts on patients' everyday life; it is linked with a significant economic burden which includes cost of hospitalization, wage loss due to work absence, and restricted physical ability. [3]. Moreover, COPD being a chronic debilitating disease, patients are also confronted with daily life limitations, reduced daily activities (DAs), and reduced health-related quality of life (HRQoL) caused by complaints such as dyspnea, skeletal muscle dysfunction, and comorbidities. [4]. According to recent reports, there is a continuous increase in COPD-related mortality. It is estimated that by the year 2020, COPD will be the third leading cause of death worldwide. [5].

It is well recognized that all kinds of cooking fuels generate respiratory irritants like unburnt hydrocarbons (soot), sulphur dioxide and the oxides of nitrogen. Soot particles that are produced from chulla used for fire wood cooking perhaps are more perilous in causing chronic bronchitis changes and airway obstruction as well. According to various investigators from our country chronic bronchitis among non- smoking women was found to vary between 0.44 - 4.96 percent. [5]. The effect of domestic cooking fuels on causing various respiratory symptoms had been studied in about 3,701 women. Of these, 3,608 were non- smoking women who used either of the four different There is increasing evidence from large population centered studies indicating that a unstinting proportion of the COPD cases in a society may be ascribed to exposure to dusts, fumes, noxious gases/ vapours. The industries such as fabric manufacturing, leather manufacturing, plastics, rubber and construction are associated with augmented risk. The overall risk among never smokers it was 31 percent. Environmental tobacco exposure or passive smoking is drawing more attention owing to its considerable effects on public health. Environmental tobacco smoke is a blend of side-stream smoke and exhaled main-stream smoke. The side stream

smoke has higher concentrations of benzene, ammonia, nicotine, carbon- monoxide, and various carcinogens owing to a lower combustion temperature, than that of mainstream smoke. [6] Depending on biochemical markers, such as urinary and salivary levels of cotinine and nicotine, the degree of exposure has been estimated to be equivalent to 0.1–2 cigarettes per a day. Exposure to ETS is virtually unavoidable because it is ubiquitous in workplaces, homes and crowded areas. Environmental smoke typically troubles females to a much greater degree than males. It conveys ancillary evidence of the grave health hazards linked to environmental smoke. At home females were more commonly exposed to ETS (31% versus 19%), whereas males were more exposed outside (53% versus 7%). The females (37.7%) suffered from more symptoms due to ETS than males (21.6%). These results urge for a need to ban smoking in the public areas and workplace. The present study was done: 1. To study the clinical profile of COPD in non-smokers. 2. To identify the other risk factors (other than smoking) of COPD.

## Material and Methods

Eighty patients who were non-smokers and presented with history of cough, sputum, breathlessness or wheezing of more than 3 months duration to the medical outpatient department or admitted in medical wards of Gujarat Adani Institute of Medical Science, Bhuj, Kutch were subjected to pre and postbronchodilator pulmonary function testing. The patients whose post-bronchodilator FEV1/FVC less than 0.7 were included in this study. Ethical committee approval and written informed consent of study subjects was obtained.

Inclusion Criteria: Patients with post-bronchodilator FEV1/FVC < 0.7 who were non- smokers. Exclusion Criteria: Smokers Bronchial asthma Pulmonary tuberculosis (past or present), Interstitial lung disease, Acute left ventricular failure and pulmonary edema, bronchiectasis and chest wall deformities.

Data was collected meeting the objectives of the study with a pre-tested proforma. Detailed history was taken, clinical examination was done and necessary investigations were carried out. A computerized spirometer was used to perform lung function tests. Three satisfactory efforts from the test were recorded and the best effort among them was considered. Bronchodilation was done using 400 µg of inhaled salbutamol using a metered dose inhaler and test was repeated after 15 minutes. Other Investigations: The following other routine investigations were done. Hemogram, Serum creatinine, Blood urea, Random Blood Sugar, Sputum for gram stain and Acid Fast stain, Chest X-ray Postero-Anterior view, Urine analysis and Electrocardiogram.

## Statistical analysis

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. The variables were assessed for normality using the Kolmogorov-Smirnov test. Descriptive statistics were calculated.

## Results

Mean age of the studied patients was 54.10 + 9.82years, minimum age being 36 years and maximum age being 77 years. Majority of patients belonged to age group of 51-60 years. (Table 1) Out of the 80 cases studied, 55 patients were female and 25 patients were male. Cough and sputum were present in all of the patients while breathlessness was present in 62.5%, wheezing in 20%, fatigue in 17.5%, weight loss in 12.5%, swelling of lower limbs in 13.7%, fever in 11.2% and chest pain in 6.2% of the patients. (Table 2)

Out of 80 patients, 66 patients gave history of biomass fuel usage and exposure. All 14 patients who did not have biomass fuel exposure were males. Most of the patients with biomass exposure belonged to GOLD stage 2. About 27.12% belonged to stage 1. Around 21.35% belonged to stage 3 and only 3.20% belonged to stage 4.

Forty two patients gave history of firewood usage and 15 patients gave history of firewood and cow dung usage. Most of the patients were exposed for >3 hours, only 5 patients were exposed for 10 years.

Out of 80 patients, only 22 patients gave history of occupational exposure, 15 patients gave history of exposure to dust, 4 patient gave history of exposure to dust and husk, 4 patients gave history of exposure to husk, 6 patients gave history of exposure to coal dust and 5 patient gave history of exposure to textile mill dust. 20 percent of the patients gave history of exposure to air pollution. Of the 80 patients, crepitations were noted in 91.5% of patients. The next most common signs were decreased chest movements and Rhonchi. Raised JVP was present in 13.5% and pedal edema in 17% respectively. (Table 3)

Chest X-ray showed chronic bronchitis in 16 patients, chronic bronchitis with emphysema in 8 patients, emphysema in 21 patients and was normal in 20 patients.

**Table 1:** Age and sex distribution

| Age Group (years) | Males | Females | Total |
|---|---|---|---|
| 31-40 | 4 | 3 | 7 |
| 41-50 | 5 | 9 | 14 |
| 51-60 | 9 | 18 | 27 |
| 61-70 | 5 | 13 | 18 |
| 71-80 | 1 | 3 | 4 |
| Total | 24 | 46 | 80 |

**Table 2:** Symptoms among study participants

| Symptoms | Number of patients | Percentage |
|---|---|---|
| Cough | 80 | 100 |
| Sputum | 80 | 100 |
| Breathlessness | 50 | 62.5 |
| Wheezing | 16 | 20 |
| Fatigue | 14 | 17.5 |
| Swelling of lower limbs | 11 | 13.7 |
| Weight loss | 10 | 12.5 |
| Fever | 9 | 11.2 |
| Chest pain | 2 | 6.2 |

**Table 3:** Occupational exposure among study participants

| Occupational exposure | Number of patients | Percentage |
|---|---|---|
| No exposure | 45 | 56.2 |
| Dust | 15 | 18.7 |
| Husk | 4 | 5 |
| Dust + Husk | 4 | 5 |
| Coal dust | 6 | 7.5 |
| Textile mill | 5 | 6.2 |
| Total | 80 | 100 |

## Discussion

Proportion of COPD in nonsmokers among all COPD patients in India showed wide variation (9.4–68.6%) in different studies. Studies showed that COPD is a major public health threat in India. Patients with COPD are challenged with restricted physical activities and reduced HRQoL. This is due to dyspnea and systemic effects such as skeletal muscle dysfunction and comorbidities. Multiple drivers' interplay which enhances the complexity of living with COPD. In addition to physical functioning, it is worth exploring these drivers to get a holistic picture of the central issue.

This study demonstrates clinical profile and various risk factors associated with COPD among non-smokers. In the present study it was observed that most of the nonsmoker COPD. Patients belonged to older age group the mean age of the patients was 54.10 + 9.82years. The age distribution of the present study is comparable to Shammem *et al*., [7]. study in which the distribution was 7.3%, 56.3%, 33.3% and 3.1% for age groups 80 respectively. Most of the study subjects belonged to the age group 40-59 in the present study which was comparable to Shameem *et al*., [7]. study.

Almost more than fifty percentage of the world's total population use biomass fuel as the primary source of energy for domestic cooking, heating, and lighting. [8]. Inferior quality stoves, in addition to poorly ventilated indoors, are used by women in rural areas for cooking purposes. Such an extent of exposure to biomass fuel combustion products makes women and household members vulnerable to COPD. The biomass smoke exposure is a risk factor for developing COPD in both women and men as demonstrated in a systematic review conducted by Kurmi *et al*. [9]. In the present study history of biomass fuel exposure was present in 86% of the patients. It shows that most of study subjects in the present study with biomass exposure belonged to moderate and severe form of disease. This was comparable to the above mentioned study. It was observed that risk of COPD increased with greater the duration of biomass smoke.

Environmental tobacco smoke exposure at home and/or at work was 100% in the present study. In similar studies like Reeves *et al* [10]. and McKay AJ, *et al* [11]. the exposure was 62.58% and 60.86% respectively. Higher cumulative lifetime exposure at work and home were associated with higher risk of developing COPD. The population attributable risk for work exposure was 7% and home ETS exposure was 11%. [12]. Occupational exposures was 36%. In Shameem *et al*. [7]. it was 24%. According to American Thoracic Society, occupational exposure account for 10–20% of either symptoms or functional impairment consistent with COPD. [13]. Occupational exposure as a risk factor among nonsmoker COPD patients was also found by Lamprecht *et al*. 2008 in Austria[14]and Ehrlich *et al*. 2004 in South Africa [15].

The history of exposure to outdoor air pollution was 20 percent in the present study and it is comparable to Tarik. Mahmood *et al* [16]. study. The role of outdoor air pollution in causing COPD is unclear but appears to be small when compared with that of cigarette smoking. Air pollution from fossil fuel combustion, primarily from motor vehicle emissions in cities, is associated with decrements of respiratory function. [17].

Outdoor air pollution, transportation and trucking, farming and livestock exposure are also the factors associated with COPD, exposure of which needs to be reduced, to prevent the development of COPD and to reduce morbidity and mortality associated with it and to improve the quality of life in these individuals, large sample sized, population based studies are further needed to document exact prevalence of risk factors especially in the rural region.

## Conclusion

On the basis of these findings, it can be concluded that nonsmokers contribute a significant proportion of COPD patients. Multiple risk factors other than smoking also play a major role in development of COPD, particularly exposure to biomass smoke, treated pulmonary tuberculosis, and long standing asthma. Other nonsmoking risk factors are occupational exposure, exposure to outdoor air pollution, lower respiratory tract infection during childhood and low socioeconomic status. Further studies are required to explain the involved risk factors and their contributions to this disease to achieve reduction of the burden of COPD in nonsmoker.

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