

The Prevalence of Chronic Obstructive Pulmonary Disease (COPD) In Suburban Areas of Tamilnadu.

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Abstract: Chronic Obstructive Pulmonary Disease (COPD), a progressive and partially reversible disease, has drawn world-wide attention for its moderate prevalence rate and causing major disease burden. Considering its severity in causing morbidities and mortalities, investigation was carried out to find out the prevalence of this disease and the factors influencing the condition in COPD patients. A total of 1050 COPD patients of both sexes from suburban areas around Chennai were classified according to the severity of the disease based on spirometric indices and prevalence study was done. It concluded that the COPD patients were of almost equally distributed between sexes and the sex-wise incidence of disease was not seen. Further it also proved that, smoking is not only the cause for COPD, the other factors like ETS exposure (environmental tobacco smoking) or parental smoking, biomass (domestic) fuel exposure in women are the other common causes for COPD.

Key words: COPD, Prevalence, Spirometric indices, FEV1, FVC.

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I. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease drawing attention all over the world, causing major health care burden. In USA, it is the fourth commonest cause of death. Globally, COPD by 2020, is expected to rise to the third position as a leading cause of death and at fifth position as the cause of loss of disability adjusted life years (DALYs), according to Global Burden of Disease Study (GBDS; Murray and Lopez, 1997). The classical definition of COPD was put forth by Global Initiative for Chronic Obstructive Lung Disease, popularly called as GOLD criteria (GOLD, 2014). It defines COPD as a disease state characterized by airflow limitation that is not fully reversible. (1) It is characterized by airflow obstruction with breathing related symptoms like cough, exertional dyspnoea, expectoration and wheeze. It mainly includes chronic bronchitis and emphysema, in a co-existing manner. As the disease advances, hypoxaemia develops due to ventilation perfusion imbalance during exacerbations (i.e. when paO_2 less than 60 mm of Hg) leading to breathlessness.

With these facts in mind and its severity in causing morbidities and mortalities, the present study was carried out to find out the prevalence of this disease and the factors influencing the condition in COPD patients.

II. Materials And Methods

It is a cross sectional study, conducted in the Institute of Physiology and Experimental Medicine, Madras Medical College, after clearing the norms of the Institutional Ethical Committee. Patients of both sexes in the age group between 30 and 55, having the features of COPD were included from Institute of Thoracic Medicine Government General Hospital, Chennai-03. All the participants were informed about the study and a written consent was obtained from them. Diagnosis of COPD was done based on the GOLD criteria (1) and the patients were selected after performing the pulmonary function tests using spirometer (Super-Spiro) and the best of three consecutive tests was taken into consideration. According to GOLD criteria, in mild cases, the FEV1 (forced expiratory volume in one second) / FVC (forced vital capacity) would be less than 0.70 with FEV1 \geq 80%. Similarly, the criteria for moderate (FEV1/FVC < 0.70 with 50% \leq FEV1 \geq 80% predicted), severe (FEV1/FVC < 0.70 with 30% \leq FEV1 < 50% predicted) and very severe (FEV1/FVC < 0.70 with FEV1 \leq 30% predicted or FEV1 < 50% predicted + chronic respiratory failure) cases were fixed. Patients with other co-morbid conditions were excluded from the study. Detailed history, including the information on dietary and personal habits, was collected from each patient. Complete general as well as systemic examinations were done

With these criteria, a total of 1050 individuals of both sexes were selected;(555 males & 495 females) and study was done to find out the prevalence, incidence,etiologies and various factors affecting COPD.

III. Statistical Analysis

The data collected were subjected to basic statistical analysis (Snedecor and Cochran, 1989). Further analysis was done using statistical package for social sciences (SPSS for windows 10).

IV. Results

The COPD patients, subjected to pulmonary function test, were found to have a post-bronchodilator FEV₁ of less than 80 per cent of the predicted value, along with an FEV₁/FVC of not more than 70 per cent. Further, they had only a marginal increase in the FEV₁ value (of less than 200 ml or less than 12 per cent) from the baseline value, after 20 minutes of inhalation of bronchodilator.

Characteristics of study populations

The severity of mild, moderate type-IIA and moderate type-IIB forms of the disease were found to occur in 17, 63 and 20 per cent respectively in the sample population. The parameters pertaining to pulmonary function viz. FEV₁ / FVC and FEV₁ decreased highly significantly (P<0.01) in COPD patients. and furnished in table I

Table 1- Parameters (mean ± SD) of COPD patients

Sl. No.	Variables	COPD patients
1.	Age (years)	49.80 ± 4.77 (1050)
2.	Sex: Male (%)	53.33
	Female (%)	46.67
3.	Duration of disease (years)	15.03 ± 5.15 (1050)
4.	Quantum of smoking (pack years)	14.27 ± 4.45 (11)
5.	BMI	21.31** ± 1.73 (1050)
6.	FEV ₁ / FVC (%)	56.47** ± 6.35 (1050)
7.	FEV ₁ (%)	63.20** ± 12.22 (1050)
8.	O ₂ saturation (%)	91.07** ± 2.88 (1050)

Figures in parentheses indicate sample size; ** – Highly significant (P<0.01)

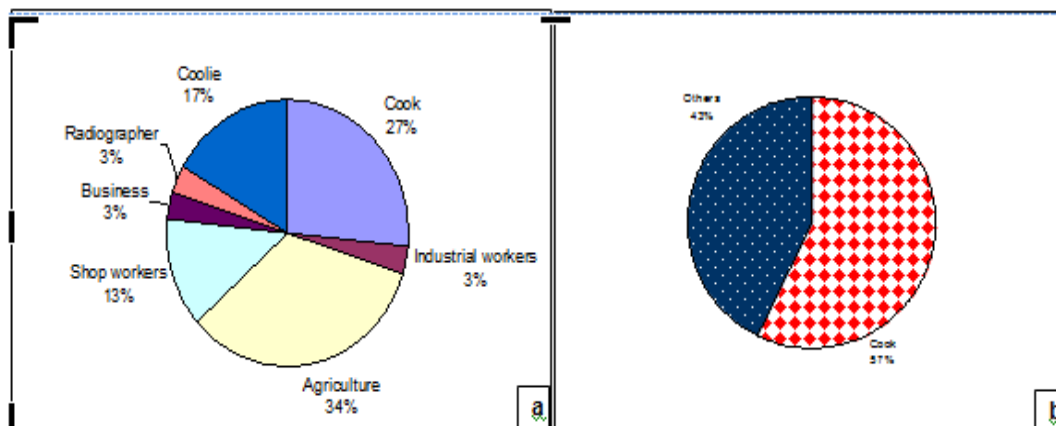


Plate 1. Distribution of COPD patients based on socio-economic status: (a) Occupation; (b) Occupation among women

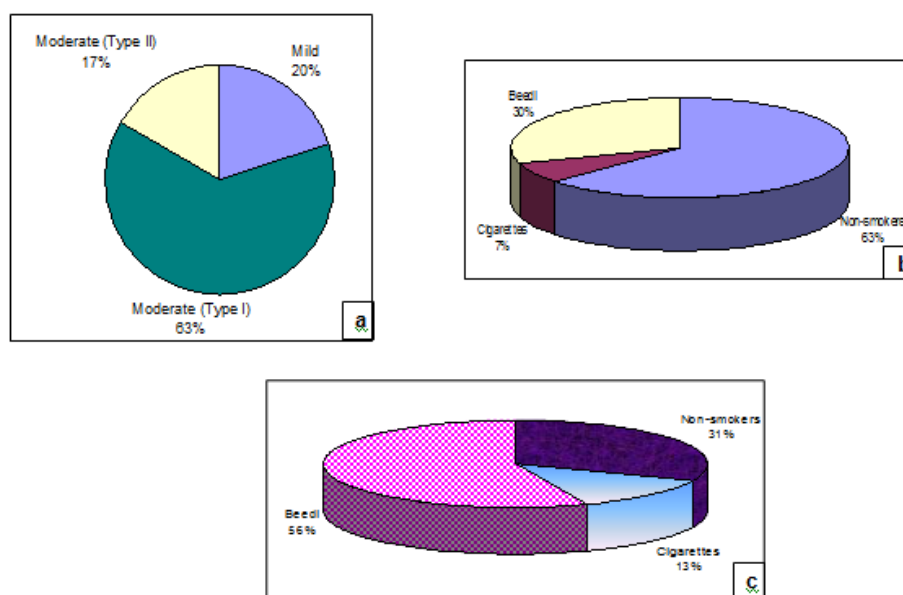


Plate2. Distribution of COPD patients based on (a) severity; (b) smoking among the study group;and(c)smoking among the male patients

V. Discussion

All the COPD patients included in the present study had irreversible or partially reversible airflow limitation which is one of the defining characteristics of COPD (GOLD criteria) as distinguished from reversible obstructive airway disease as per the recommendations of CIBA Symposium (2) and American Thoracic Society (ATS) Committee on Diagnostic Standards (3). However, most of the earlier studies did not have conformity regarding the reversibility criteria as recommended; but were taken into consideration in the present study.

Characteristics of study subjects

The mean age of COPD patients observed in the present study was 49.80 years who ranged from 30 to 55 years. The duration of illness of the COPD patients selected were from as low as 5 to as high as 30 years which averaged 15.06 ± 5.15 . Among the 1050 COPD patients, 555 (53 per cent) were males and the remaining 495 (47 per cent) were females. Hence, in this study, distribution of individuals in the COPD was almost equal and uniform according to gender.

Of the 1050 COPD individuals, 37 per cent of patients were the habitual smokers; with the mean pack years of 14.27 ± 4.45 . The body mass indices (BMI) was estimated to be 21.31 ± 1.73 for COPD patients with the respective ranges from 18.26 to 24.56. The ventilatory capacity of the lung (FEV1/FVC) calculated for the COPD patients was found to be very low (56.47 ± 6.35 percent; Plate 1) Similarly, the timed-vital capacity (FEV 1 per cent) was also correspondingly lesser (63.20 ± 12.22 per cent). The oxygen saturation in COPD patients was 91.07 ± 2.88 percent. The parameters such as BMI, ventilatory capacity, timed-vital capacity and O_2 saturation were found to be low significantly.

The incidence of COPD observed even in the younger age could be attributed to genetic cause, as already proven by many studies that alpha₁-anti trypsin deficiency is one of the common causes for COPD. Moreover, the COPD patients were almost equally distributed between sexes and the sex-wise incidence of disease was not seen. However, according to GOLD (1), there is an increasing trend of COPD in females though it has plateaued in males.

In a recent estimate by Reddy *et al.* (2005),(7) it was reported that the burden of chronic diseases in India accounted for 53 per cent of all deaths and 44 per cent of DALYs. Of which, COPD accounted for 7 per cent of deaths and 3 per cent of DALYs lost. Even this was obviously an underassessment since there was inadequate information available on COPD. According to Jindal *et al.* 2001,(6) a median prevalence of 5 per cent in men and 2.7 per cent in women accounting for a total burden of 8.15 million male and 4.21 million female patients among the population of 944.5 million in India during 1996. While in south India, a prevalence rate of 40.8 per 1000 males and 25.5 per 1000 females was reported (Ray *et al.*, 1995)(8)

The quantum of smoking among the patients was 14.27 pack years which appeared to be more. Even then, there was no significant difference observed between the smokers and non-smokers. Similar findings were also reported by Kayacan *et al.* (2001)(4) and Sezer *et al.* (2007).(5) But the evidence of smoking as a

predominant factor was observed by Fishman (2007)(9) in producing the airflow obstruction in the lung. Among the smokers, majority (81.8 %) were habituated with the 'beedi' smoking which is comparatively more potent than cigarette smoking as observed in the study. The poor economic status of the people in India reflects the higher percent of people opting for *beedi*. The high risk of *Beedi* smoking was reported in our country by Chhabra *et al.* (2001),(10) as more than 2.5 pack years was more commonly associated with chest symptoms and airways obstruction than cigarette smoking.

World-wide cigarette smoking is the most commonly encountered risk factor for COPD, although in many countries air pollution resulting from burning of wood and other biomass fuels have also been identified as risk factors. When genetically susceptible individuals have close proximity to these risk factors for a long duration and at high doses, chronic inflammation occurs and chemical, physiological and pathological changes like chronic bronchitis and emphysema develops.

This is supported in this study that occupation-wise, 57 per cent of females harbouring the disease were cook which shows an association of biomass fuel exposure in the pathogenesis of COPD. In this study, out of 1050 patients, 662 were non- smokers (>63 per cent). This shows the rising trend of COPD incidence even among non-smokers, though tobacco smoking is the commonest cause of COPD. Thus, one could conclude that ETS exposure (environmental tobacco smoking) or parental smoking, biomass (domestic) fuel exposure in women and alpha1-antitrypsin deficiency are the other common causes for COPD.

The COPD subjects were belonging to different occupational groups; of which, 57 per cent (283 out of 495) of women were cook by occupation amounting 26.67 per cent in the overall COPD patients selected for the study. Other occupation included the subjects doing business, working in tea and provision shops and radiographers (Plate 1a). Majority of COPD patients (33.33 per cent) were involved in agricultural work. The prevalence of the disease is more in the low income group, accounting for 90 per cent (Plate 1b). Similarly, in male patients, 31 percentage of them were non-smokers; and among the remaining 69 per cent, 56 per cent and 13 per cent were habituated with *beedi* and cigarettes respectively (Plate 2c). The severity of mild, moderate type-IIA and moderate type-IIB forms of the disease were found to occur in 17, 63 and 20 per cent of the population respectively (Plate 2a).

VI. Conclusion

We can conclude from this study that the prevalence of COPD is more or less equal in both sexes. Although, cigarette smoking is the commonest cause of COPD ETS exposure (environmental tobacco smoking) or parental smoking, biomass (domestic) fuel exposure in women and alpha1-antitrypsin deficiency are the other common causes for COPD. It is highly prevalent in lower socioeconomic group. Since, It is the third commonest cause of death the above factors should be kept in mind, while designing the management protocol for these patients.

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