

Respiratory Risk Realities: Exploring the Epidemiological Insights into Burden of Chronic Obstructive Pulmonary Disease among Smokers in Chennai

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Abstract:

Background: COPD is an increasing health issue in the world, particularly in India whereby the prevalence of smoking is on the rise. It was estimated that approximately 10.6-12.1 percent of the global population succumbed to the disease every year in 2020 and that smoking is the most avoidable and the greatest risk factor of COPD especially in adults in Chennai. **Objective:** Study objective was to establish the prevalence of COPD in male smokers in Chennai, and to find out the relationship between the intensity of smoking and the severity of the disease and quality of life. **Materials and Methods:** A cross sectional survey was conducted on 200 smoked male patients aged 40-60 who attended a physiotherapy outpatient clinic. All participants gave an affirmative report of at least three months of persistent cough and sputum per year in the last two years. Women, non-smokers, and persons with lung tuberculosis, heart diseases, new surgery or new infection, asthma, or bronchodilators were excluded. The St. George Respiratory Questionnaire (SGRQ) evaluated health-related quality of life (HRQoL) and COPD was diagnosed using the 2025 GOLD spirometry. **Results:** Among 200 smokers, COPD patients were significantly older than non-COPD smokers (mean difference=9.2;p=0.001). The number of pack-years of smoking was strongly associated with the development of COPD as well as with the lowering of HRQOL ($r=0.61$; $p<0.001$). **Conclusion:** Male smokers in Chennai have a high prevalence of COPD and more severe cases of the disease with poor quality of life. Such results highlight the necessity of screening improvement and more strong anti-smoking measures in the area.

Keywords: Chennai, COPD, HRQOL, smoking, spirometry, SGRQ.

Introduction:

The primary cause of chronic obstructive pulmonary disease (COPD) is the chronic exposure to harmful gases and particles, especially smoke, and are characterized by irreversible airflow obstruction and progressive deterioration of lung functions. COPD is a significant cause of morbidity and mortality, and nearly 480 million people in the world have this disease [11-16]. The cost of the disease is increasing in India. In India, the prevalence is

7.4 on average; higher levels are expected in such states as Tamil Nadu where smoking is the most prevalent behaviour among all age groups compared to GATS1. 8, 9. It is reported that 45 percent of males and 7.6 percent of women in Chennai have consumed tobacco products at some time in their lives. Smoking is one of the extrinsic variables that worsen COPD, which is a polygenic disease, requiring prioritization in order to estimate the burden of a situation. There are 14 review studies that were carried out on COPD in 2001 by the Jindal et al. at the Chandigarh Department of Respiratory Medicine [21]. Two of the fourteen studies of COPD were conducted in South India [22, 23]. It is important to note that when making decisions, planning, setting priorities and allocating the available resources, it is important. Studies have indicated an increase of smoking by the people. The monetary impact of these conditions is needed to plan a course of therapy and expenditure on conditions such as chronic pulmonary illness (COPD), which is associated with avoidable risk factors. In high-income nations to the extent of 70 per cent of COPD diagnosis is a result of smoking. Smoking is another risk factor in India with over 40 percent of men in Chennai reporting tobacco product use [7-10]. The burden of COPD in various populations in India especially the urban smokers needs to be systematically studied due to the effect of COPD on lifespan as well as the standard of life. This paper employs pulmonary functions tests and health-related quality of life measurements to investigate smoking men in Chennai to fill the gaps in the literature on COPD prevalence and its relationship with the impact of smoking in the southern part of India.

Materials and Methods:

This study was a cross-sectional observational study that took place at the Out Patient Department of Physiotherapy. It was started after getting Approval from Institutional Review Board (ACVPRU-1022/ PHYSIO / IRB / 2024-2025) in line with the Declaration of Helsinki (2013). The survey was conducted as an extension of a previously registered clinical trial. The parent study was prospectively registered with the Clinical Trials Registry of India (CTRI), Government of India (Registration No. CTRI/2025/06/089194. The survey component was undertaken to generate additional public health-relevant evidence without any deviation from the registered protocol or increase in participant risk. All the participants were informed about the research through written informed consent. Two hundred male smokers between 40 and 60 years old, who had a history of chronic productive cough of at least three months a year over two years, were recruited. The exclusion criteria involved the female gender, non-smokers, pulmonary tuberculosis, cardiovascular, recent surgery (within 3 months), acute respiratory infection (within 3 weeks), bronchial asthma, and recent use of bronchodilators (within 6 hours). Assessments Respondents underwent the St. George's

Respiratory Questionnaire (SGRQ) a validated self-reported tool which measures symptoms, activity and psychosocial effects resulting in scores ranging between 0 and 100 with higher scores representing more severe impairment. COPD diagnosis was done by spirometry through a GOLD 2025 criteria with airflow obstruction being defined as post-bronchodilator FEV₁/FVC < 0.70, with the staging as shown in table -1.

Table -1: GOLD Classification of COPD

GOLD Stage	FEV₁ (% predicted)	Criteria
Stage I	≥ 80%	Mild airflow limitation
Stage II	50% – <80%	Moderate airflow limitation
Stage III	30% – <50%	Severe airflow limitation
Stage IV	< 30%	Very severe airflow limitation

The Statistical analysis of the data was done using SPSS v27. The test of normality was done through Kolmogorov-Smirnov test. The prevalence, descriptive statistics and the GOLD staging distribution were reported. The correlation coefficient of Pearson was used to test the interrelationship between pack-years and COPD severity/SGRQ scores. HRQoL scores were compared in groups by means of independent t-tests. The p value of 0.05 was used as a statistical significance threshold.

Results: The diagnosis of COPD was carried out in 78 subjects, with a prevalence rate of 39. The GOLD steps were spread out as as given in Table – 2.

Table -2: Distribution of GOLD stages

GOLD Stage	Frequency (n)	Percentage (%)
Stage I	17	22.4
Stage II	30	38.5
Stage III	22	28.2
Stage IV	9	10.9

Pack-years of smoking (intensity) and GOLD stage ($r = 0.61$; $p < 0.001$) had significant correlation.

Table 3: Mean SGRQ scores

Domain	Mean ± SD
Symptoms	30.63 ± 13.78
Activity	8.44 ± 12.18
Impact	8.18 ± 11.18
Total	12.0 ± 10.5

The total SGRQ scores of COPD-positive smokers were significantly higher, as compared to COPD-negative smokers (mean difference = 9.2; 95% CI: 7.3-

11.1; $p < 0.001$), which suggests poor health-related quality of life as given in Table - 3.

Discussion:

The given study adopted the St. George Respiratory Questionnaire (SGRQ) as a tool of assessment to determine how smoking affected the lung health and wellbeing as well as the overall quality of life of the Chennai residents. According to our findings, it is evident that respiratory complications are prevalent among smokers and largely affect their lives. Rajkumar et al. (2017) [27] highlighted the importance of obtaining reliable epidemiological information in their approach and rationale of conducting a study on the prevalence of COPD in India. Although we focused on a specific sample of smokers in Chennai, our analysis confirms national prevalence statistics by defining the functional and clinical outcome in this high-risk group. In a study on COPD occurrence in Madurai, Tamil Nadu [28], by Saleem et al. they found out that prevalence levels varied depending on the diagnosis criteria. Although our SGRQ ratings are not directly equal to their prevalence prediction, they show the large symptomatic load that is the basis of prevalence. It means that the problem of respiratory health in adults residing in the region is chronic, especially in smokers. Studies carried out all over the world also have shown the significant correlation between smoking and COPD.

In this respect, Lindberg et al. (2005) [29] in Sweden demonstrated the effects of various diagnostic criteria to determine prevalence rates and repeatedly emphasized that smoking habits are one of the risk factors, which is why our study targeted smokers. The Worldwide Incidence of Obstructive Lung Disease (BOLD) Effort recognised that smoking was also one of the key elements in the disease burden and tried to standardise the prevalence identification across the globe as stated by Buist et al. (2005) [30]. The local evidence in our findings of the high levels of SGRQ scores in the Chennai smokers is in line with the global trend of smoking as a factor towards the poor respiratory health. The prevalence and severity of respiratory diseases are testified in further studies done in India.

Sharma et al. (2016) [31] in a study of chronic respiratory conditions in a rural area of North Western India found risk factor which are often related to smoking and exposure to the environment. Salvi et al. (2011) [32] provided an abstract indicating the overall prevalence of COPD in a rural Indian community, which underscored the fact that the disease is widespread even in the non-urban setting. Our findings prove the notion that smoking is a major cause of health adverse effect even in a metropolis like Chennai. The study conducted by Parasuramalu et al. (2014) [33] examined the growing COPD prevalence rate and its relationship with tobacco consumption and

ambient cigarette smoking among a rural population in India, which proved the clear linkage between the two diseases.

The specific purposes of our research as the smoking habit of those who smoke are in particular focus of the study since the harm was well presented in the SGRQ scores. Verma et al. (2021) [34] also performed a systematic and pooled study to synthesise the available data regarding the prevalence of COPD in India. Smoking was always observed to be a serious risk factor even though with high variability.

The results of our SGRQ can add to this literature since it measures the adverse health impacts on smokers within a local metropolitan setting. International studies are still progressing towards elucidating smoking habits and COPD threat. A recent study by Rey-Brandariz et al. (2023) [35] based on a cross-sectional study also confirmed that there is a strong association between smoking and obstructive lung disease as well as gave updated data on smoking habits and COPD risk. According to a study conducted by Shahab et al. (2006) [36] investigating the relationship between smoking addiction and prevalence of COPD in the population of a country, there was a high dose-dependent relationship between smoking and COPD occurrence. Despite the fact that our study was clear on the consequences of the application of SGRQ instead of smoking prevalence, the high SGRQ scores observed in our smoking group are in line with these established relationships showing the immediate consequences of smoking tobacco products. Lastly, though Salvi and Barnes (2009) [37] placed emphasis on the primary risk factors by highlighting the prevalence of COPD in the general population, their findings indirectly confirmed the fact that smoking is the main cause of COPD, as it is the subject of our research.

The St George Respiratory Questionnaire (SGRQ) which provides an in-depth assessment in addition to spirometric measures was also important in establishing the effects of COPD on the overall health-related quality of life of the patient as is the case in our study. Due to the potential of SGRQ to define the complex burden of COPD, more detailed knowledge of the impact of the disease in this specific group became possible. Future studies ought to incorporate longitudinal studies in order to determine in the long term impacts of such findings and the efficacy of the interventions that are designed to enhance the quality of life of the patient in terms of SGRQ [38, 39]. There was significant statistical significance in the overall scores of St. George Respiratory Questionnaire (SGRQ) in the current study ($p = 0.000$), with the mean score of Symptoms, Activity, Impact, and Total as 30.63 +- 13.78, 8.44 +- 12.18, 8.18 +- 11.18, 12 +- 10.5 respectively. These findings indicate that genuine smokers in Chennai who were the participants in the study had a quality of life that was poorer, fewer activities, and a significant amount of respiratory disorders.

The extremely high significance of the overall SGRQ score indicates that the number of pulmonary morbidity of people in this at-risk group is high and that the specified effect is not the consequence of chance. Although the SGRQ is a measure of health-specific quality of life, the scores are higher indicating the existence of respiratory illnesses, most of which are COPD since the focal group is smokers.

Our research results, specifically the ones regarding the health-specific quality of life of smokers are consistent with and provide a closer depiction of the bigger picture of COPD in India and globally. In Chennai, as per the current research, COPD is present in 39 percent of male smokers, which is also in accordance with the estimates of this area and proves the critical role that tobacco plays in the formation of the disease [27-34]. The close positive association between smoking pack- year and HRQoL impairment and severity of the disease indicates the necessity of specific cessation programs and preventive strategies. By integrating spirometric diagnosis with quality-of-life assessments, our findings indicate the clinical and patient-experienced burden of COPD by using this underreported population. The COPD effects should be decreased by means of not only thorough pulmonary rehabilitation but also early detection of the disease.

Conclusion:

Male smokers in Chennai have high burden of COPD and stage of the disease as well as reduced quality of life closely relates with intensity of smoking. To reduce the impact of COPD in India, the findings can be helpful in terms of enhanced screening and tailored smoking control measures.

Limitations:

This study has cross-sectional design, making it impossible to infer cause-effect. There is a reduction in the generalisability in cases whereby the smokers are restricted to urban males. Also, self-reported smoking history might introduce memory bias.

Future recommendations:

Longitudinal research on the development of COPD and the usefulness of interventions in different Indian scenarios would be required among women, rural and biomarker combinations.

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