Original Research Article

Epidemiological Profile and Clinical Spectrum of COPD Patients in a Tertiary Care Hospital

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Abstract:

Background: Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality worldwide, particularly in developing countries like India, where underdiagnosis and delayed treatment remain common. Understanding the epidemiological and clinical spectrum of COPD patients is essential for improving disease management.

Methods: This cross-sectional, observational study included 110 spirometry-confirmed COPD patients attending a tertiary care hospital. Data on demographics, smoking history, comorbidities, nutritional status, pulmonary function, and radiological findings were collected using a structured proforma. Spirometric grading was performed according to GOLD criteria, and descriptive statistics were applied.

Results: Most patients were older adults, with peak prevalence in the 61–65 years group (21.82%). A strong association with smoking was observed, with the largest subset having 56–60 pack-years (19.09%). Hypertension and diabetes were frequent comorbidities, with 40% of patients having both. Nearly one-fourth (25.45%) were underweighted, while 47.27% had normal BMI. Spirometry revealed predominantly moderate (40%) obstruction, followed by very severe (25.45%) and severe (20%) disease, indicating late presentation. Radiological findings were heterogeneous, with increased bronchovascular markings (26.36%) and emphysematous changes (22.73%) being common, though 26.36% had normal chest X-rays.

Conclusion: COPD in this cohort was strongly linked to age and cumulative smoking exposure, frequently complicated by hypertension, diabetes, and undernutrition. Most patients presented in moderate to very severe stages, while radiological changes were variable and often non-specific. Early detection through routine spirometry, aggressive smoking cessation strategies, nutritional interventions, and integrated comorbidity management are essential to improve outcomes and reduce disease burden.

Keywords: COPD, epidemiology, spirometry, comorbidities.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a major global health burden and is projected to become the third leading cause of death worldwide by 2030, accounting for significant morbidity, mortality, and socioeconomic costs [1]. It is characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities, usually caused by significant exposure to noxious particles or gases [2].

The most common risk factor remains cigarette smoking, though other exposures such as biomass fuel use, occupational hazards, and genetic predispositions also contribute significantly, particularly in developing countries [3,4]. In India, COPD represents one of the leading causes of chronic morbidity, with prevalence estimates ranging between 4% and 10% in adults, depending on the diagnostic criteria and study population [5]. The disease often remains underdiagnosed and untreated until moderate or severe stages, contributing to a high rate of hospital admissions and disease burden [6]. Moreover, comorbid conditions such as hypertension, diabetes, and cardiovascular diseases frequently coexist with COPD, complicating management and worsening prognosis [7].

Nutritional abnormalities, particularly underweight and cachexia, are also well recognized in COPD patients and are linked to poorer outcomes and increased mortality [8,9]. Given its chronic nature and association with multiple risk factors and comorbidities, the epidemiological profiling of

COPD patients in different regions provides valuable insights into disease distribution, risk factor burden, and clinical presentation. Such information is essential for guiding prevention strategies, optimizing clinical management, and improving patient outcomes. This study, therefore, was undertaken to evaluate the epidemiological characteristics, comorbidities, nutritional profile, spirometric severity, and radiological findings among COPD patients in a tertiary care hospital setting.

Methodology

Study design: This was a cross-sectional, observational study conducted in the Department of Pulmonary Medicine at a tertiary care hospital. The study aimed to evaluate the epidemiological profile and clinical spectrum of patients diagnosed with COPD.

Study population: A total of 110 patients with confirmed COPD, attending the outpatient department and inpatient wards during the study period, were included. Diagnosis of COPD was based on clinical history, risk factor assessment, and spirometric confirmation according to the GOLD (Global Initiative for Chronic Obstructive Lung Disease) criteria.

Inclusion Criteria:

- Patients aged ≥35 years.
- Clinically diagnosed cases of COPD confirmed by spirometry (post-bronchodilator FEV1/FVC ratio <0.70).
- Both newly diagnosed and previously diagnosed patients were included.

Exclusion Criteria:

- Patients with acute respiratory infections or acute exacerbation of COPD at the time of evaluation.
- Patients with other chronic lung diseases such as bronchiectasis, interstitial lung disease, or pulmonary tuberculosis.
- Patients unwilling to participate in the study.

Data Collection: After obtaining informed consent, a detailed history was recorded, including demographic details, smoking history (in pack-years), occupational exposure, and duration of symptoms. Clinical evaluation was performed to assess comorbidities such as hypertension and diabetes mellitus.

Anthropometric assessment: Body Mass Index (BMI) was calculated using weight/height² (kg/m²) and patients were categorized into underweight, normal, overweight, and obese according to WHO classification.

Investigations:

- Spirometry: All patients underwent pulmonary function testing using a standardized spirometer. Severity of airflow limitation was graded as mild, moderate, severe, or very severe as per GOLD classification.
- Chest radiography: Standard posteroanterior view chest X-ray was performed in all patients to look for findings such as cardiomegaly, emphysematous changes, and bronchovascular markings.
- Comorbidity assessment: Presence of hypertension and diabetes was documented based on clinical history, medication use, and available medical records.

Statistical analysis: The collected data were compiled and tabulated. Descriptive statistics including frequency and percentage were used to summarize categorical variables such as age, smoking exposure, comorbidities, BMI categories, spirometry grading, and radiological findings. The data were analyzed using SPSS software and results were presented in tables and charts.

Results

In this study of 110 COPD patients, the majority of cases were seen in the elderly population. Age distribution showed that the highest number of patients 24 (21.82%) belonged to the 61–65 years group, followed by 16.36% in the 56–60 years group and 14.54% in the 51–55 years group.

Relatively fewer patients were younger, with only 3.63% in the 36–40 years category and 7.28% in the 41–45 years category, indicating that COPD was predominantly observed in individuals above 50 years of age (Table 1).

Table 1: Age-wise Category of COPD Patients

Age	No Of Patients	Percentage (%)
36-40	4	3.63
41-45	8	7.28
46-50	7	6.36
51-55	16	14.54
56-60	18	16.36
61-65	24	21.82
66-70	15	13.64
71-75	10	9.1
76-80	8	7.27

Smoking history revealed a significant cumulative exposure, as reflected in pack-years.

The largest group of patients (19.09%) had smoked 56–60 pack-years, while 16.36% fell in the 31–35 pack-year range and 14.55% in the 51–55 range. Patients with 41–45 pack-years and those with ≥60

pack-years each comprised 12.73% of the study group.

In contrast, only 6.36% of patients had a smoking exposure ≤30 pack-years, clearly establishing a dose–response relationship between tobacco consumption and COPD severity (Table 2).

Table 2: Smoking Exposure (Pack-Years) among the Study Population

Smoking In Packs/Year	No Of Patients	Percentage (%)
≤30	7	6.36
31-35	18	16.36
36-40	11	10
41-45	14	12.73
46-50	9	8.18
51-55	16	14.55
56-60	21	19.09
≥60	14	12.73

Comorbidity assessment demonstrated that 40% of patients had both hypertension and diabetes, while 23.64% had hypertension alone and 16.36% had diabetes alone. A smaller proportion, 20%, did not have any comorbidity, suggesting that a majority of COPD patients suffered from additional systemic illnesses (Table 3).

Table 3: Associated Comorbid Conditions in COPD Cases

Comorbities	No of Patients	Percentage (%)
Diabetes	18	16.36
Hypertension	26	23.64
Both	44	40
None	22	20

Nutritional status, assessed by BMI, showed that nearly half of the patients (47.27%) had normal BMI values, while 25.45% were underweight, reflecting the adverse metabolic impact of COPD. Overweight individuals comprised 24.55% of the group, and 2.73% were mildly obese. No patient was categorized as moderately obese, highlighting the tendency towards undernutrition and weight loss in advanced COPD (Table 4).

Table 4: Body Mass Index Patterns Observed in COPD Patients

BMI	No of Patients	Percentage (%)
≤18 Underweight	28	25.45
18-25 Normal	52	47.27
25.1-30 Overweight	27	24.55
30.1-35 Mild Obesity	3	2.73
35.1-40 Moderate	0	0

Spirometric evaluation revealed that most patients had significant impairment of pulmonary function. Moderate obstruction was the most common finding (40%), followed by very severe disease in 25.45% and severe disease in 20%. Only 14.55% of patients were classified as having mild disease, indicating that the majority presented at later stages of illness with advanced functional limitation (Table 5).

Table 5: Severity Classification Based on Pulmonary Function Tests

Pulmonary Function Test	No of Patients	Percentage (%)
Mild	16	14.55
Moderate	44	40
Severe	22	20
Very Severe	28	25.45

Chest X-ray findings were heterogeneous across patients. While 26.36% of the cases showed no abnormality, an equal proportion (26.36%) demonstrated increased broncho vascular markings. Cardiomegaly was seen in 24.55% of patients, and 22.73% showed features consistent with emphysema. These findings highlight that radiological abnormalities are common in COPD but may not always be present, as a significant proportion of patients had normal chest radiographs despite established disease (Table 6).

Table 6: Radiological Chest X-ray Findings in COPD Patients

Chest X Ray	No of Patients	Percentage (%)
Normal	29	26.36
Cardiomegaly	27	24.55
Increased Bronchovascular Markings	29	26.36
Features Suggestive Of Emphysema	25	22.73

Discussion

The present study highlights important epidemiological and clinical features of COPD in a tertiary care population. Age-wise analysis demonstrated that most patients were in the 6th and 7th decades of life, with peak prevalence in the 61–65 years group. This supports the well-established fact that COPD is a progressive disease that predominantly manifests later in life, reflecting the cumulative effects of environmental exposures and age-related decline in lung function [6]. The low number of patients in the younger age groups further emphasizes the chronic nature of disease development.

Smoking history in our patients revealed a strong association with disease severity. The largest subset had 56–60 pack-years of exposure, and a considerable proportion had ≥60 pack-years, indicating a direct relationship between cumulative tobacco exposure and progression of COPD. The finding that only a small number of patients had ≤30 pack-years exposure suggests that while lower smoking exposure may still lead to disease, advanced and severe cases are typically associated with higher smoking indices. This is consistent with global evidence that smoking remains the most significant modifiable risk factor for COPD [2,3,5].

Comorbidities were found in a large proportion of patients, with hypertension and diabetes being the most common. Interestingly, 40% of patients had both conditions simultaneously, underscoring the systemic involvement of COPD and its close link with cardiovascular and metabolic disorders. These comorbidities may further worsen disease outcomes, increase hospitalizations, and complicate management [7]. The high prevalence highlights the importance of routine screening and integrated management of comorbid conditions in COPD patients. Nutritional assessment through BMI revealed that a significant proportion of patients were underweight. This reflects the hypermetabolic and catabolic state associated with COPD, which often results in muscle wasting and weight loss. Malnutrition is a known poor prognostic factor, associated with higher mortality and reduced quality of life [8]. Although some patients were overweight, obesity was relatively rare, which may be due to disease-related cachexia in advanced cases. These findings reinforce the role of nutritional support as an important aspect of COPD management [9].

Spirometry results showed that moderate COPD was the most common stage, but a large fraction of patients also had severe and very severe disease, with only a small proportion in the mild category. This distribution suggests that patients often present late in the disease course, possibly due to under-recognition of early symptoms or delayed health-seeking behavior [5]. Early detection and regular use of spirometry could therefore play a pivotal role in diagnosing COPD at earlier stages and improving patient outcomes.

Radiological findings in this study were diverse. Increased bronchovascular markings and emphysematous changes were frequently observed, consistent with chronic airway inflammation and parenchymal damage. Cardiomegaly in nearly one-fourth of patients indicates the cardiovascular impact of chronic lung disease, possibly due to pulmonary hypertension and cor pulmonale [10]. Interestingly, more than one-fourth of patients had normal chest X-rays, despite clear evidence of COPD on spirometry. This highlights the limitations of radiography as a diagnostic tool and underscores the role of pulmonary function tests as the gold standard for COPD diagnosis [2].

Overall, this study emphasizes that COPD is a disease of older adults, strongly associated with smoking, compounded by comorbidities, and often accompanied by malnutrition. Most patients present at moderate to very severe stages, with variable radiological findings. These observations stress the importance of preventive strategies such as smoking cessation, early spirometry-based screening, integrated management of comorbidities, and nutritional support to improve patient outcomes.

Conclusion

COPD in this study was most prevalent among older adults, strongly linked with cumulative smoking exposure, and frequently associated with hypertension, diabetes, and undernutrition. Most patients presented in moderate to very severe stages as per GOLD criteria, indicating delayed diagnosis, while chest X-ray findings were variable and often non-specific.

These results highlight the need for early spirometric screening, smoking cessation, nutritional support, and integrated management of

comorbidities to improve outcomes and reduce disease burden.

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