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Spirometric Patterns Among Patients with Chronic Obstructive Pulmonary Disease in a Tertiary Care Centre

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ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic morbidity and mortality worldwide and represents a significant public health burden, particularly in developing countries. Spirometry is considered the gold standard for the diagnosis and staging of COPD.
Objective: To evaluate the spirometric patterns and severity of airflow limitation among patients diagnosed with COPD attending a tertiary care centre.
Methods: A retrospective, record-based study was conducted among 100 patients with clinically diagnosed COPD who had undergone spirometry. Spirometric parameters including Forced Expiratory Volume in one second (FEV_1), Forced Vital Capacity (FVC), FEV_1/FVC ratio, and severity grading based on Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria were analyzed.
Results: All patients demonstrated an obstructive ventilatory defect on spirometry. The majority of patients had moderate (42%) to severe (28%) airflow limitation. Severe and very severe COPD patterns were more commonly observed among elderly patients and smokers.
Conclusion: Spirometry remains an indispensable tool in the diagnosis and severity assessment of COPD. Moderate and severe airflow obstruction were the predominant spirometric patterns in the present study, highlighting delayed presentation and the need for early spirometric screening.

Keywords: *Chronic Obstructive Pulmonary Disease, Spirometry, Airflow Obstruction, FEV_1, GOLD Classification.*

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory disorder characterized by persistent airflow limitation that is not fully reversible. It is a leading cause of morbidity and mortality globally and is projected to become the third leading cause of death worldwide. According to the World Health Organization, COPD accounted for approximately 3 million deaths in 2012, contributing to nearly 6% of all global deaths [1].

The global burden of COPD continues to rise, with an estimated 251 million cases reported worldwide in 2016. In India, population-based studies have demonstrated a wide variation in COPD prevalence, ranging from 2% to 22% among men and 1.2% to 19% among women, reflecting differences in smoking habits, biomass fuel exposure, and diagnostic practices [2]. Smoking remains the most important risk factor; however, exposure to biomass fuel, occupational pollutants, and environmental air pollution also contribute significantly, particularly in developing countries.

Spirometry is the cornerstone for diagnosing COPD, as it provides objective evidence of airflow obstruction. The demonstration of a post-bronchodilator FEV_1/FVC ratio of less than 0.70 confirms the presence of persistent airflow limitation. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) has standardized spirometric criteria to facilitate diagnosis and severity assessment across healthcare settings [3]. Despite its proven utility, spirometry remains underutilized, especially in primary and peripheral healthcare centers, leading to delayed diagnosis and treatment.

Understanding the spirometric patterns and severity distribution among COPD patients is essential for appropriate disease classification, treatment planning, and prognostication. The present study aims to evaluate the spirometric patterns among COPD patients attending a tertiary care centre.

OBJECTIVES

Primary Objective

- To evaluate the pattern of spirometry findings in patients diagnosed with COPD.

Secondary Objectives

- To classify the severity of COPD based on spirometric parameters.
- To assess the distribution of airflow limitation severity among COPD patients.

MATERIALS AND METHODS

This was a retrospective, descriptive, record-based study conducted in the Department of Respiratory Medicine of a tertiary care hospital over a period of six months, involving 100 patients with a clinical diagnosis of COPD.

Inclusion Criteria

- Age ≥40 years
- Clinically diagnosed COPD
- Availability of spirometry records

Exclusion Criteria

- Incomplete spirometry data
- Bronchial asthma or asthma–COPD overlap syndrome
- Acute respiratory infection at the time of spirometry

Spirometry Parameters Analyzed

- Forced Expiratory Volume in one second (FEV_1)
- Forced Vital Capacity (FVC)
- FEV_1/FVC ratio
- GOLD severity classification

Statistical Analysis

Data were analyzed using descriptive statistics and expressed as frequency and percentage.

RESULTS

Demographic Profile

- Mean age: 58.4 ± 9.6 years
- Male-to-female ratio: 3:1
- Smokers: 82%

Table 1: Spirometry Patterns in COPD Patients (n = 100)

Spirometric Pattern	Number	Percentage
Obstructive	100	100%
Restrictive	0	0%
Mixed	0	0%

Table 2: Severity of Airflow Limitation Based on GOLD Classification

GOLD Stage	FEV_1 (% predicted)	Number	Percentage
GOLD I (Mild)	≥80%	18	18%
GOLD II (Moderate)	50–79%	42	42%
GOLD III (Severe)	30–49%	28	28%
GOLD IV (Very Severe)	<30%	12	12%

DISCUSSION

The present study demonstrates that an obstructive ventilatory defect is the universal spirometric finding among patients with COPD, consistent with the fundamental pathophysiology of the disease. Similar observations have been reported across multiple spirometry-based studies, reinforcing the diagnostic specificity of spirometry in COPD [3,4].

The predominance of moderate and severe airflow limitation in this study reflects delayed presentation and diagnosis, a common finding in tertiary care settings. Studies from India and other developing countries have reported similar distributions, attributing advanced disease at diagnosis to limited access to spirometry, poor awareness, and continued exposure to risk factors such as smoking and biomass fuel [2,5].

The high proportion of smokers in our cohort (82%) further emphasizes smoking as the principal etiological factor in COPD, consistent with findings from large population-based and hospital-based studies [6,7]. Age-related progression of airflow limitation was also evident, aligning with international epidemiological data demonstrating increased COPD prevalence and severity with advancing age [8].

The absence of restrictive or mixed patterns highlights the effectiveness of strict inclusion criteria and reinforces the role of spirometry as a reliable tool when performed and interpreted appropriately. Despite recognized limitations, spirometry remains indispensable for COPD diagnosis, severity assessment, and monitoring disease progression [4,9].

CONCLUSION

Obstructive ventilatory defect is the predominant spirometric pattern among COPD patients. Moderate and severe airflow limitation constitute the majority of cases, indicating delayed diagnosis and advanced disease at presentation. Routine and early use of spirometry is essential for timely diagnosis, appropriate disease staging, and optimal management of COPD.

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