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Asthma-chronic obstructive pulmonary disease misdiagnosis: cause for concern or false alarm?

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Abstract

Chronic obstructive pulmonary disease (COPD) and asthma are both heterogeneous disorders characterized by overlapping respiratory symptoms. Due to overlapping symptoms and underuse of spirometry, there is often misdiagnosis between these two disorders. A cross-sectional observational study was carried out at the respiratory outpatient department (OPD) of a tertiary care respiratory center in western Maharashtra for 1 year. All patients over the age of 40 who were diagnosed with asthma or COPD and were referred to the respiratory OPD for management or were already under follow-up at the center were included in the study. Questionnaires and spirometry were used to evaluate all patients. A total of 85 patients who met the inclusion criterion without any exclusion requirements were included; 5 patients out of 45 who were initially labelled as having asthma (11.11%) and 29 patients out of 40 who were initially labelled as having COPD (72.5%) were found to have been misdiagnosed according to study protocol. In conclusion, there is a significant prevalence of misdiagnosis amongst obstructive airway disease. The patients with a diagnostic label of COPD are more likely to be misdiagnosed due to a lack of knowledge of diagnostic protocol, underuse and misinterpretation of spirometry, and overreliance on chest radiography. Use of spirometry is dismally low and correlates with other studies from India. The study clearly indicates the urgent requirement of educating doctors, especially primary care clinicians, about the correct diagnostic protocols used in the diagnosis of COPD and bronchial asthma.

Key words: asthma, COPD, misdiagnosis, spirometry.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) and asthma are both heterogeneous disorders characterized by persistent respiratory symptoms, including cough, breathlessness, and wheezing [1,2]. Asthma is a prevalent condition, with its global prevalence varying between 1% and 29% [1], while the Burden of Obstructive Lung Disease (BOLD) program reports an overall COPD prevalence of 11.8% [2]. The misdiagnosis of asthma and COPD remains a significant clinical challenge, often arising from inadequate history-taking and the insufficient use of spirometry. A study by Heffler et al. examined the concordance between clinical diagnoses and spirometry-based diagnoses in 300 patients, revealing that 69.5% of asthma diagnoses and only 13.3% of COPD diagnoses were concordant with spirometry results. Furthermore, spirometry was utilized in only 55% of cases for diagnostic confirmation [3]. Such discrepancies are concerning, particularly given that current guidelines for COPD stipulate a post-bronchodilator FEV1/FVC ratio of <0.7 for diagnosis, while asthma guidelines emphasize the necessity of spirometry with reversibility testing for definitive diagnosis [1,2]. The underutilization of spirometry can lead to significant underdiagnosis of obstructive airway diseases, a phenomenon well-documented in studies worldwide [4]. In India, a survey by Vanjare et al. found spirometry usage among chest physicians, general physicians, pediatricians, and general practitioners to be 72%, 26%, 16%, and 12%, respectively [4]. Similarly, the Asia-Pacific Asthma Insights and Management (AP-AIM) study reported that up to 75% of patients had never undergone lung function testing [5].

The distinction between these two diseases is not merely academic; their pathophysiology, clinical course, and therapeutic strategies differ substantially [6]. Asthma treatment predominantly involves inhaled corticosteroids, while COPD management focuses on bronchodilators, with corticosteroids reserved for specific subgroups [1,2]. However, the primary impetus for early and accurate diagnosis, particularly in COPD, is to initiate smoking cessation programs, which can substantially alter the disease trajectory and slow the decline in lung function [7]. Smoking cessation is a key intervention in COPD management, with evidence demonstrating that cessation can significantly reduce the rate of FEV1 decline, thereby improving both symptoms and survival [8]. Despite substantial efforts to improve awareness and diagnostic accuracy, misdiagnosis remains a pervasive issue, particularly in India. This study was therefore designed to investigate the prevalence of misdiagnosis of COPD as asthma, and vice versa, among patients aged over 40 years in an urban community setting.

Materials and Methods

This study was a cross-sectional observational analysis conducted over a one-year period at the respiratory outpatient department (OPD) of a tertiary care respiratory center in western

Maharashtra. All patients aged over 40 years who had been diagnosed with asthma or COPD and were referred to, or already under follow-up at, the respiratory OPD were included. Patients with acute myocardial infarction within the past month, anginal chest pain, diffuse parenchymal lung disease, long-term oxygen therapy, or those unable to undergo spirometry were excluded.

A structured questionnaire was administered by the principal investigator to collect demographic information (name, age, sex, address), exposure to risk factors (e.g., smoking, biomass fuel, vehicular pollution), symptom duration, allergic history, chest examination findings (wheeze), radiological investigations (CXR, CT scan), and details of the initial diagnosis. Smoking exposure was quantified using the smoking index [9]. A clinical diagnosis was made based on the gathered information, and all patients underwent spirometry to confirm the diagnosis. Spirometry was conducted using the VIASYS Computerized Body Plethysmograph, model Masterscreen Body. A reversibility in FEV_1 of >12% and 200 ml was considered necessary for diagnosis of asthma in appropriate clinical setting (1). The presence of post bronchodilator FEV_1/FVC <0.70 was used to confirm diagnosis of COPD (2).

Results

A total of 184 patients with a diagnosis of asthma or COPD presented at the respiratory outpatient department (OPD) during the study period. Of these, 85 patients who met the inclusion criteria without any exclusion requirements were included in the study. The mean age of the patients was 58.71 years. The study group consisted of 61 males (71.8%) and 24 females (28.2%). Among the study group, 58 subjects (68.2%) were non-smokers, while 27 (31.8%) were smokers. Of the smokers, 20 (23.5%) were reformed smokers, while 7 (8.2%) were still smoking at the time of presentation. Smoking exposure was quantified based on the smoking index (SI) [9]. Of the smokers, 13 (15.29%) were classified as heavy smokers (SI >300), 9 (10.59%) were moderate smokers (SI: 100-300), and 5 (5.88%) were mild smokers (SI <100). The mean smoking index was 358.51. Additionally, 9 patients (10.6%) were exposed to other risk factors, including biomass fuel smoke, environmental tobacco smoke, and vehicular pollution.

The demographic profile of the study population, based on the initial diagnosis of asthma or COPD, is presented in Table 1. The initial diagnosis was made by a general practitioner (GP) in 32 patients (37.6%), by a general physician in 42 patients (49.4%), and by a chest physician in 11 patients (12.9%). Spirometry was performed for the initial diagnosis in 13 patients (15.2%). The use of spirometry for the initial diagnosis was 3.12%, 11.9%, and 63% among GPs, general physicians, and chest physicians, respectively.

Among the 45 patients initially diagnosed with bronchial asthma, 40 (88.88%) were confirmed to have bronchial asthma according to the study protocol. In the group of 40 patients initially diagnosed with COPD, only 11 (27.5%) were confirmed to have COPD. Five patients initially diagnosed with asthma (11.11%) and 29 patients initially diagnosed with COPD (72.5%) were found to have been misdiagnosed, as per the study protocol. The diagnostic accuracy of GPs, general physicians, and chest physicians in diagnosing asthma and COPD is provided in Table 2. The characteristics of the patients, stratified according to the final diagnosis, are outlined in Table 3.

Among the patients misdiagnosed as bronchial asthma, the most common cause of misdiagnosis was the failure to account for a history of allergic symptoms, triggers, and seasonal variation. The presentation at a later age and smoking or other risk factor exposure often acted as confounding factors. In two of these patients, spirometry was performed for the initial diagnosis but was misinterpreted. Among the patients misdiagnosed with COPD, the primary cause of misdiagnosis was the failure to recognize significant exposure to risk factors. The various causes of misdiagnosis and their frequency in the study population are presented in Table 4.

Discussion

COPD and asthma are among the most prevalent obstructive airway diseases encountered in general practice. Despite their shared clinical features, including chronic cough, breathlessness, and wheezing, these conditions often present with similar symptoms. However, without a thorough history that accounts for significant exposure to risk factors, age of symptom onset, allergic history, seasonal variation, or specific triggers, clinicians may mistakenly form an incorrect initial impression of a patient's symptoms and erroneously diagnose the condition. Despite ongoing efforts to enhance public awareness of these diseases and provide diagnostic guidelines for clinicians, underdiagnosis and misdiagnosis remain significant clinical issues. In our study, 34 patients (40%) were initially misdiagnosed. Similar findings were reported by Tinkelman et al., who documented a 50% misdiagnosis rate in COPD patients [10]. Diagnosis of obstructive airway diseases is frequently delayed, as patients often regard symptoms such as cough (with or without expectoration) as inconsequential or non-threatening. Furthermore, exertional breathlessness may go unnoticed, especially in patients with sedentary lifestyles. This is particularly common in asthma patients, as their symptoms are often episodic and initially less disabling. Misdiagnosis, in turn, leads to delays in initiating appropriate treatment or exposure avoidance strategies. Evidence suggests that providing patients with objective data demonstrating a loss of lung function can significantly enhance outcomes, particularly in smoking cessation efforts [7,11].

In our study, 7 patients (8.2%) continued smoking at the time of inclusion, and would likely have benefitted from smoking cessation programs had they received the correct diagnosis initially. Early identification of disease in the course of its progression provides greater motivation for patients to quit, and their efforts can still yield significant benefits. The Lung Health Study, which randomized 6,000 middle-aged smokers to a smoking cessation program and followed them for five years, demonstrated that sustained quitters had an annual decline in Forced Expiratory Volume in 1 second (FEV1) of 31 mL/year, compared to 62 mL/year in those who continued smoking [12]. Unfortunately, smoking cessation advice is often overlooked as part of routine medical practice.

Moreover, the treatment provided in emergency situations can sometimes mean the difference between life and death. For example, if a COPD patient is mistakenly treated as a "known asthmatic" with high-flow oxygen, it may result in dangerous carbon dioxide retention. COPD patients incorrectly diagnosed as asthma may be over-prescribed steroids, leading to minimal therapeutic benefit and an increased risk of side effects. Additionally, the psychological impact of a misdiagnosis—especially when a chronic, life-threatening disease is involved—should not be underestimated. Such errors can cause patients to feel uncertain about the course, prognosis, and management of their condition.

Misdiagnosis can occur for a variety of reasons. In our study, the most frequent cause of misdiagnosis was the failure to identify a history of allergic symptoms. This is more likely in patients presenting at an older age, where a detailed history of seasonal symptoms, triggers, and nasal allergies may be overlooked, and they may be erroneously classified as having COPD. The reasons for the underdiagnosis of asthma in elderly patients remain unclear, but it is often attributed to the diagnostic challenges faced when distinguishing asthma from COPD in this population. Bellia et al. conducted a multicentric study that examined misdiagnosis in elderly asthmatic patients, identifying factors contributing to the misdiagnosis and underdiagnosis of asthma in this age group. They found that 19.5% of asthmatic patients were mistakenly diagnosed with COPD, and 27.3% had never received an asthma diagnosis. The primary correlates of misdiagnosis were older age and disability. The authors concluded that asthma in the elderly is frequently confused with COPD [13]. In our study, 23 patients initially diagnosed with bronchial asthma were misclassified as having COPD, mainly due to being over the age of 60. In these cases, a detailed inquiry into the onset and progression of symptoms was not conducted, although many had typical historical evidence of asthma or a history of asthma and allergies, either in childhood or adulthood. Furthermore, most of these patients either lacked a significant history of exposure to COPD risk factors or had only mild exposure that had ceased years before symptom onset.

In our study, most patients misdiagnosed as having COPD were elderly individuals presenting with a history of chronic cough and breathlessness. Chest radiographs were taken, and hyperinflation was interpreted as indicative of COPD. However, efforts to assess lung function and confirm the diagnosis through objective testing were lacking. Spirometry, a key diagnostic tool for obstructive airway diseases, was frequently omitted by both primary and secondary care physicians when making respiratory diagnoses. Time constraints, staffing limitations, and a lack of confidence in interpreting spirometry data were identified as significant contributors to this issue. In our study, spirometry was performed for the initial diagnosis in only 13 of the 85 patients (15%). Earlier studies from India have similarly reported a low rate of spirometry use in the diagnosis of obstructive airway diseases [4,5]. Notably, among the 13 patients who underwent spirometry, the majority were referred by chest physicians. Of the 11 patients initially diagnosed by chest physicians, 7 (63.6%) had spirometry performed, while only 6 (8.1%) of the 74 patients diagnosed by medical officers or general physicians had spirometry requested for initial diagnosis. Furthermore, in two of these cases, spirometry was incorrectly interpreted, resulting in a misdiagnosis of COPD despite the presence of reversible obstruction. These findings underscore that, despite recommendations from the Global Initiative for Asthma (GINA) and the Global Initiative for Chronic Obstructive Lung Disease (GOLD), spirometry remains an underutilized tool.

Our study has several limitations. Data collection primarily relied on patient recall and OPD follow-up records. The study population, although fairly representative, was predominantly composed of urban and semi-urban individuals. It is reasonable to assume that in rural areas, where healthcare resources are even more limited, the rate of misdiagnosis could be significantly higher.

Conclusions

This observational study, conducted in an outpatient department (OPD) setting, highlights a significant prevalence of misdiagnosis among patients with obstructive airway diseases. Individuals diagnosed with Chronic Obstructive Pulmonary Disease (COPD) are particularly prone to misdiagnosis, primarily due to insufficient knowledge of diagnostic protocols, the underutilization and misinterpretation of spirometry, and an overreliance on chest radiography.

The use of spirometry in diagnosing obstructive airway diseases remains alarmingly low, a finding that aligns with other studies conducted in India. The results of this study underscore the urgent need for targeted education of healthcare providers, particularly primary care clinicians, regarding the correct diagnostic protocols for COPD and bronchial asthma. Furthermore, it is imperative to encourage clinicians to incorporate spirometry into their

diagnostic practices, as it is a crucial tool for accurate diagnosis and effective management of obstructive airway diseases.

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Table 1. Demographic profile of study population classified based on initial diagnosis.

Characteristic	**Variable**	Initial Diagnosis Asthma (n=45)	Initial Diagnosis COPD (n=40)
Demographics	Age (mean)	53.56 ± 12.96	64.50 ± 8.68
	Age (categories)		
	40 – 49	25 (55.56%)	2 (5.0%)
	50 – 59	6 (13.33%)	7 (17.50%)
	60 – 69	4 (8.89%)	20 (50.0%)
	70 – 79	9 (20.0%)	8 (20.0%)
	80+	1 (2.22%)	3 (7.50%)
	Male	28 (62.22 %)	33 (82.50 %)
	Mean age of males	58.56 ± 14.05	66.09 ± 8.06
	Female	17 (37.78 %)	7 (17.50 %)
	Mean age of females	48.12 ± 8.82	57.0 ± 9.79
Smoking (n = 45)	Smoking Status		
	Current (%)	1 (2.22%)	6 (15.0%)
	Reformed (%)	2 (4.44%)	18 (45.0%)
	Non smoker (%)	42 (93.33%)	16 (40.0%)
	Other Risk factors	5 (12.50%)	5 (12.50%)
Pulmonary function	Spirometry (Pre and post BD)	n=8	n=5
	Mild obstruction	2 (25.0%)	0
	Moderate obstruction	5 (62.50%)	4 (80.0%)
	Severe obstruction	1 (12.50%)	1 (20.0%)

Table 2. Diagnostic accuracy by initial diagnosis.

	Correctly diagnosed (Initial & Final diagnosis same)	%
General Practitioner (n=32)	17	53.13
Physician (n=42)	24	57.14
Chest physician (n=11)	10	90.91

Table 3. Patient characteristics stratified according to the final diagnosis.

Characteristic	Variable	Final diagnosis COPD (n=16)	Final diagnosis asthma (n=69)
Demographics (n=16)	Age (mean)	67.50 ±7.81	56.67 ± 12.50
	Age (categories)		
	40 – 49	0	27 (39.13%)
	50 – 59	3 (18.75%)	10 (14.49%)
	60 – 69	5 (31.25%)	19 (27.54%)
	70 – 79	7 (43.75%)	10 (14.49%)
	80+	1 (6.25%)	3 (4.39%)
	Male	13 (81.25 %)	48 (69.57 %)
	Mean age of males	68.85 ± 7.41	
	Female	3 (18.75 %)	21 (30.43 %)
	Mean age of females	61.67 ± 8.08	
Smoking	Smoking Status		
	Current (%)	5 (31.25%)	2 (2.90%)
	Reformed (%)	7 (43.75%)	13 (18.84%)
	Non smoker (%)	4 (25.00%)	54 (78.26%)
	Other Risk factors	5 (31.25%)	4 (5.80%)
Pulmonary function		Post Bronchodilator n=16	Pre and post bronchodilator n=69
	Moderate obstruction	6 (37.50%)	21 (30.43%)
	Severe obstruction	6 (37.50%)	30 (43.48%)
	Very severe obstruction	4 (25.0%)	18 (26.09%)

Table 4. Likely causes for misdiagnosis in the study population.

	Final diagnosis of asthma	Final diagnosis of COPD
History of risk factor missed	0	5
History of allergic symptoms, triggers and seasonal variation missed	29	0
Wrong interpretation of Spirometry	2	0
Age at presentation >60 years	23	0
Presence of risk factors causing confusion	17	0