

# Study of clinical, radiological, and pulmonary function characteristics of patients having asthma-chronic obstructive pulmonary disease overlap syndrome

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## ABSTRACT

**Background:** Asthma-chronic obstructive pulmonary disease (COPD) overlap syndrome defined as a syndrome characterized by persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD. This overlap makes the difference between COPD and asthma with persistent airflow limitation difficult, especially in smokers and elderly people. **Objective:** The objective of the study was to study the clinical features, radiological and pulmonary function characteristics of patients having asthma-COPD overlap syndrome. **Materials and Methods:** A cross-sectional study carried out at the Department of Respiratory Medicine, Government Medical College, Baroda, attached to SSG Hospital, Vadodara. A total of 100 patients enrolled which were clinically diagnosed with chronic airway obstruction as defined in the GOLD/GINA asthma-COPD overlap syndrome (ACOS) guidelines. **Results:** In this study, a total of 100 patients were enrolled, out them 76 patients were male and 24 patients were female. Fifty-three patients were from urban area and 47 patients from rural area. Most patients belong to age ranging from 40 to 86. Ninety-nine patients had a breathlessness and it was the most common symptom followed by chronic cough in 93 patients, sputum production in 70 patients, wheezing in 70 patients, running nose in 65 patients, and chest tightness in 46 patients. In smoking history, 25 patients were current smoker, 49 patients were ex-smoker, and 26 patients had never smoked in their life. In pulmonary function test, 26 patients had a normal test, 13 patients had obstructive abnormality with no significant bronchodilator reversibility, 54 patients had a obstructive abnormality with significant bronchodilator reversibility, and 7 patients had a restrictive abnormality. **Conclusion:** Clinically diagnosed ACOS patients were mostly males, belong to middle age groups, had breathlessness, wheezing, chronic cough with sputum production, and rhinitis and sneezing as the major symptoms. The pulmonary function tests revealed majority of the patients having obstructive pattern in pulmonary function test (spirometry). Furthermore, a majority of these patients had significant positive bronchodilatory response.


**KEY WORDS:** Asthma-Chronic Obstructive Pulmonary Disease Overlap Syndrome; Pulmonary Function Test; Breathlessness

## INTRODUCTION

Chronic airway diseases are most common chronic airway diseases, which are burden for future social and economical

condition.<sup>[1]</sup> Asthma and chronic obstructive pulmonary disease (COPD) are different airway disease and very common respiratory problems and having some common clinical features and risk factors.<sup>[2]</sup> Asthma-COPD overlap syndrome (ACOS) has been identified as a clinical condition having clinical features of asthma and COPD both, with clinical course differing from other chronic airway diseases.<sup>[3-5]</sup>

Asthma and COPD are a different airway problem with same clinical features, epidemiological features, and pathophysiological mechanism. Asthma is an allergic

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condition that often develops during any of age, but it can be diagnosed in adult life. It is characterized by air hyper-responsiveness of airways that lead to intermittent airway obstruction and it is usually reversible so during normal condition asthma patients having symptom free period, whereas in COPD is chronic respiratory disease that is related to smoking tobacco and in subjects older than 40 years of age and characterized by progressive disease and usually it is irreversible airway obstruction; so, COPD patients are usually symptomatic and no symptom free period.<sup>[6,7]</sup> ACOS is a clinical condition in that older adult with a smoking history and has a feature of asthma in addition to their COPD.<sup>[8]</sup> In patients of COPD, there are features of asthma and vice versa. In this study, we studied a clinical features, radiological feature, and pulmonary function test (PFT) abnormality in ACOS patients.

In general, patient diagnosed with asthma or COPD although patient having feature of ACOS because awareness about ACOS is very less. If patient above 40 years of age and smoker presented with clinical symptom of obstructive airway disease should be screened for ACOS, patient might had symptom of asthma in childhood but neglected and after the development of COPD features patient aggravated symptom so came to physician at that time ACOS screening required. The aim of this study was to aware of ACOS and screening for ACOS of patient before put on COPD or asthma management, because line of management of asthma and COPD and ACOS are different so if patient clinically diagnosed ACOS, patient will get benefit of treatment.

### Objectives

The objectives of this study were as follows:

1. To study the clinical history, presenting features, and current disease status of the ACOS patients
2. To study PFT of the asthma-COPD overlap syndrome (ACOS) patients
3. To study a radiological features of the chest radiograph of the ACOS patients
4. To study the correlation between the clinical, radiological, and pulmonary functions of the ACOS patients.

### MATERIALS AND METHODS

A cross-sectional study was carried out at the Department of Respiratory Medicine, SSG hospital, Vadodara, attached to Government Medical College, Baroda, Vadodara. In this study, a total of 100 patients were enrolled after taking permission of the Institutional Ethical committee.

### Inclusion Criteria

The following criteria were included in the study:

1. Patients having age 40 years or more and symptom of chronic cough, sputum production, dyspnea, wheezing, or repeated acute lower respiratory tract infection

2. Patients having a history of smoking tobacco, chulha smoking, and other substances or exposure to environmental hazards.

### Exclusion Criteria

Patients having a history of tuberculosis and pre-existing cardiac disease not involved in the study.

After enrollment in the study, detailed clinical examination and history of symptoms along with its duration were taken. All patients underwent for routine blood investigation, chest X-ray, and pulmonary function test (spirometry).

### RESULTS

In this study, a total of 100 patients were enrolled, out them 76 patients were male and 24 patients were female. Fifty-three patients were from urban area and 47 patients from rural area. As shown in Table 1, most patients belong to age ranging from 40 to 86. Among the symptom, as shown in Table 2, 99 patients had a breathlessness and it was the most common symptom followed by chronic cough in 93 patients, sputum production in 70 patients, wheezing in 70 patients, running nose in 65 patients, and chest tightness in 46 patients. In smoking history, 25 patients were current smoker, 49 patients were ex-smoker, and 26 patients had never smoked in their life. Among those had a smoking history, 49 patients (66%) had a total duration of smoking more than 10 pack-years and 25 patients (34%) had a less than 10 pack-years.

In routine blood investigation, 8 patients had eosinophil count more than 6. In a chest X-ray, as shown in Table 3, 59 patients had a normal chest X-ray, 24 patients had a hyperinflation of lung, 8 patients had bilateral reticulonodular changes, 5 patients had a changes of old granuloma, and 4 patients had a homogenous opacity. In pulmonary function test, as shown in

**Table 1:** Age-wise distribution of patients

Age group (in years)	No. of patients
40–50	38
51–60	30
61–70	22
71–80	9
81–90	1

**Table 2:** Symptom profile of patients

Symptoms	No. of patients
Breathlessness	99
Chronic cough	93
Sputum production	70
Wheezing	70
Running nose	65
Chest tightness	46

Table 4, 33 patients had a ratio of post-bronchodilator forced expiratory volume in 1 s (FEV1) and forced vital capacity (FVC) was greater than 70% and in 67 patients, ratio of post-bronchodilator FEV1 and FVC was <70%. Improvement in post-bronchodilator FEV1 more than 12% and 200 ml found in 74 patients. In pulmonary function test, as shown in Table 5, 26 patients had a normal test, 13 patients had obstructive abnormality with no significant bronchodilator reversibility, 54 patients had a obstructive abnormality with significant bronchodilator reversibility, and 7 patients had a restrictive abnormality.

## DISCUSSION

In our study, males were more affected than female, and most of patients from the age group of 40–60 years of age. Majority of patients in our study had symptom of dyspnea in 99 patients followed by chronic cough in 93 patients and sputum production and wheezing in 70 patients. In radiological analysis, 59 patients had a normal chest X-ray and 24 patients had a hyperinflated lung. In PFT findings, 26 patients had normal spirometry and 67 patients had a obstructive abnormality and 7 patients had a restrictive abnormality.

Majority of the patients in this study were male (76%) and females were 24%. Kim *et al.*<sup>[9]</sup> also reported more number of males than females in their study. Smoking is more common in male and males also higher exposure to environment

**Table 3:** Radiological features analysis of patients

Chest X-ray findings	No. of patients
Normal	59
Hyperinflation of lungs	24
Bilateral reticulonodular markings	8
Old granulomatous change	5
Homogenous opacity	4

**Table 4:** Pulmonary function test (spirometry) of patients

Spirometric parameter	No. of patients
FEV1/FVC ratio was >70%	33
FEV1/FVC ratio was <70%	67
Post-bronchodilator FEV1 more than 12% and 200 ml	74
Post-bronchodilator FEV1 ≤12% and 200 ml	26

FVC: Forced vital capacity, FEV1: Forced expiratory volume in 1 s

**Table 5:** Pulmonary function test pattern of patients

Spirometry pattern	No. of patients
Normal	26
Obstructive with no significant BDR	13
Obstructive with significant BDR	54
Restrictive	7
Total	100

BDR: Bronchodilator reversibility

pollution. Majority of the patients in this study had complaints of breathlessness or dyspnea (99%). Apart from dyspnea, chronic cough (93%), sputum production (70%), wheezing (70%), running nose (65%), and chest tightness (46%) were the common symptoms; however, de oca *et al.*<sup>[10]</sup> reported that wheezing was the most common complaints, but the other major symptoms remained the same as with the present study that was dyspnea, sputum production, and cough. Baarnes *et al.*<sup>[11]</sup> found that cough was the most common symptom in the enrolled subjects followed by dyspnea and sputum production.

In this study, 25 patients were current active smokers while 49 patients were ex-smoker and 26 patients had never smoked in their life. Mannino *et al.*<sup>[12]</sup> stated that active smoker or past smoking status was consistently associated with ACOS.

Limitation of this study was enrollment of small number of patients if we enrolled more patients, we will get better results.

## CONCLUSION

Clinically diagnosed ACOS patients were mostly males, belong to middle age groups, had breathlessness, wheezing, chronic cough with sputum production, and rhinitis and sneezing as the major symptoms, suffered from high modified Medical Research Council grades of dyspnea, and had positive smoking history. The PFT revealed majority of the patients having obstructive pattern in pulmonary function test (spirometry). Furthermore, a majority of these patients had significant positive bronchodilatory response. X-ray chest PA reporting for most patients was found to be normal followed by the findings of hyperinflation of lung fields. However, no significant eosinophilia was seen in the patients.

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