

Asthma-chronic Obstructive Pulmonary Disease Overlap (ACO) among Patients of Asthma and Chronic Obstructive Pulmonary Disease in a Tertiary Care Center

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ABSTRACT

Background: To estimate the prevalence of asthma-chronic obstructive pulmonary disease (COPD) overlap among patients of asthma and COPD and to compare its frequency in both groups.

Materials and methods: About 200 patients presenting to the out patient department (OPD) and in patient department (IPD) between April 1, 2021 and July 31, 2022 were enrolled and inquired about their symptoms. History regarding smoking, biomass fuel exposure, old pulmonary tuberculosis or a family history of obstructive airway disease was obtained. All these patients performed spirometry and based on GINA-GOLD guidelines, they were diagnosed as asthma, COPD, or asthma-chronic obstructive overlap (ACO).

Results: About 125 patients out of a total of 200 were known cases of COPD while 75 were known cases of asthma. Post-spirometry, 112 patients were diagnosed as COPD (56%), 59 as asthma (29.5%) and 29 were labeled as ACO (14.5%). From a total of 125 COPD patients, 13 had ACO which is 10.4%. In contrast out of 75 asthma patients 16 had ACO which is 21.33%. Asthma and ACO patients belonged to a younger age group and COPD patients were older (p -value < 0.001). A male predominance was found among ACO patients with 21.8% of total male patients being diagnosed as ACO while only 5.6% of females were labeled as ACO (p -value 0.001).

Conclusion: Asthma-chronic obstructive overlap patients are underdiagnosed and frequently mislabeled as either asthma or COPD. These patients have a male predominance and are younger as compared with COPD patients. Spirometry should be done in all patients having symptoms of obstructive airway disease to make a final diagnosis.

Keywords: Asthma-chronic obstructive overlap, Asthma, Chronic obstructive pulmonary disease.

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ABBREVIATIONS USED IN THIS ARTICLE

ACO = Asthma-chronic obstructive overlap; COPD = Chronic obstructive pulmonary disease; IPD = In patient department; OPD = Out patient department.

INTRODUCTION

Asthma-chronic obstructive overlap (ACO) is a new disease entity and is characterized with includes features of both asthma and chronic obstructive pulmonary disease (COPD). These patients were first reported in 2009 by Gibson and Simpson¹ Literature reports a prevalence rate for asthma-COPD overlap between 15 and 55%, with variation by gender and age. This wide range reflects the different criteria that have been used by researchers for diagnosing asthma and COPD.^{2,3} The most widely accepted and applied diagnostic criteria is the one proposed by GINA-GOLD.

GINA and GOLD in 2014 collaborated on a joint project on asthma-COPD overlap and labeled it as asthma-COPD overlap syndrome or ACOS. ACOS, according to these guidelines was characterized by persistent airflow limitation with several features that it shares with both asthma and COPD.³ Such patients are usually aged above 40 years, with intermittent episodes and a history of smoking/or other toxic exposures. They also have symptoms suggestive of asthma or a childhood diagnosed asthma and show good response to bronchodilators or inhaled corticosteroids.

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A confirmed diagnosis of asthma-COPD overlap is based on spirometry in which post-bronchodilator FEV₁/FVC is <0.7 and there is a 400 mL and 12% reversibility in EV₁. Such patients when treated with inhaled corticosteroids have a higher risk of exacerbations.³ Patients with ACOS experience a greater disease burden compared with their counterparts with asthma or COPD alone, but they show better response to inhaled corticosteroid treatment than their counterparts.² Asthma-COPD overlap is a disease which is highly underdiagnosed, with progression and poor prognosis, so it requires early diagnosis and vigorous treatment monitoring and more research is necessary in this to reduce the morbidity and mortality.

This study aims to find the prevalence of ACO among patients of asthma and COPD. This study will help the pulmonologists, clinicians, and especially those in primary care and non-pulmonary specialties, about early diagnosis, safe treatment, and referral where necessary.

MATERIALS AND METHODS

Study Design

This is a cross-sectional study.

The present study was approved by the ethical committee of the institute. All participants included in the present study gave written consent. Patients with a prior diagnosis of COPD according to GOLD guidelines and asthma according to GINA guidelines who presented in out patient department (OPD) and in patient department (IPD) of the Department of Pulmonology of a tertiary care center of Northern part of India between April 1, 2021 and July 31, 2022 were enrolled for the study. This study included a total of 200 adult patients.

Exclusion Criteria

- Patients with ischemic heart disease/left heart failure, unstable angina.
- Heart rate >120 bpm.
- Systolic BP>180 and/or diastolic BP>120.
- Respiratory failure.
- Neurological/musculoskeletal/and peripheral vascular disease in lower extremities.
- Pneumonia.
- Lung cancer.
- Tuberculosis.
- Respiratory illness in which patient’s movements were compromised, domiciliary oxygen therapy, noninvasive ventilation, acute exacerbation of COPD.

A detailed history included their symptoms, smoking status, biomass fuel exposure, history of pulmonary tuberculosis and a family history of obstructive airway disease was recorded. General physical and detailed local examination of the chest was documented. Spirometry was performed on these patients based on the latest GINA-GOLD guidelines, and they were diagnosed as COPD, asthma or ACO. If the FEV₁/FVC ratio post-bronchodilator was <0.7, the patient was labeled as having COPD. If the ratio was reversed post-bronchodilator with an increase in FEV₁ by 12% and 200 mL, the patient was labeled as an asthmatic. If the FEV₁/ FVC ratio post-bronchodilator was <0.7 but with rise in FEV₁ post-bronchodilator by 12% and 400 mL, then the patient was labeled as ACO.

Patients with COPD were graded in four severity groups as per GOLD guidelines,

- Mild–FEV₁ >80%.
- Moderate–FEV₁ > 50% but <80%.
- Severe–FEV₁ > 30% but <50% and
- Very severe–FEV₁< 30%.

Statistical Analysis

The present study included 200 patients for statistical analysis. The data were represented as number and percentage. We used Chi-squared test to find association among various categorical variables. One-way ANOVA was used to compare mean values in different sub-groups. P-value of < 0.05 was considered statistically significant

Table 1: Association of demographic variables with ACO patients

Variables	ACO				Total	χ ² value	p-value
	Absent		Present				
	N	%	N	%			
Clinical diagnosis							
COPD	112	89.6	13	10.4	125	4.520	0.034*
BA	59	78.7	16	21.3	75		
Sex							
Female	85	94.4	5	5.6	90	10.560	0.001*
Male	86	78.2	24	21.8	110		
Cough							
Absent	81	85.3	14	14.7	95	0.008	0.928
Present	90	85.7	15	14.3	105		
Breathlessness							
Absent	40	85.1	7	14.9	47	0.008	0.930
Present	131	85.6	22	14.4	153		
Wheezing							
Absent	112	88.9	14	11.1	126	3.155	0.076
Present	59	79.7	15	20.3	74		
Biomass fuel exposure							
Absent	157	84.4	29	15.6	186	2.553	0.110
Present	14	100	0	0	14		
Old PTB							
Absent	160	85.1	28	14.9	188	0.392	0.531
Present	11	91.7	1	8.3	12		
Smoker							
Absent	144	85.7	24	14.3	168	0.039	0.844
Present	27	84.4	5	15.6	32		
Family h/o OAD							
Absent	163	85.8	27	14.2	190	0.257	0.612
Present	8	80	2	20	10		

and p-value of < 0.001 was considered as highly significant. All analysis of the present study was performed using SPSS 23.0 ver.

RESULTS

This cross-sectional study consisted of a study group of 200 patients that met the inclusion criteria. 90 were females and 110 were males. Cough was present in 52.5% (105) patients while 47.5% (95) of the total had no complaint of cough. Breathlessness was a symptom in 76.5% (153) patients of airflow obstruction while 23.5% (47) had no complaint of breathlessness. Wheezing was a symptom in a smaller proportion of the patients such that only 37% (74) gave a history of wheezing. Out of 200 cases enrolled for the study 125 patients were known cases of COPD while 75 were known cases of asthma. Post-spirometry 112 patients were diagnosed as COPD (56%), 59 as asthma (29.5%) and 29 were labeled as ACO (14.5%).

From a total of 125 COPD patients, 13 turned out to be patients of ACO which is 10.4%. In contrast, 21.33% asthma patients had ACO (16 out of 75 patients). The prevalence of ACO among asthma patients was more than double the prevalence among COPD patients (p-value 0.039). A male predominance was found among ACO patients as 21.8% of total male patients were diagnosed as ACO while only 5.6% females were labeled as ACO (p-value 0.001) (Table 1).

Table 2: Association of variables with COPD, bronchial asthma and ACO

Variables	COPD (n = 112)		BA (n = 59)		ACO (n = 29)		p-value
	Mean	± SD	Mean	± SD	Mean	± SD	
Age	55.89	15.547	45.05	16.635	45.41	16.513	<0.001
Cough	49.492	79.0752	58.268	162.0665	24.933	39.8734	0.604
Breathlessness	54.907	81.1284	41.800	84.3705	42.886	81.4327	0.642
Wheezing	79.188	100.1714	78.593	129.0531	25.367	39.5458	0.211

Table 3: Association of age among COPD, asthma and ACO patients

Associations	COPD (n = 112)	BA (n = 59)	ACO (n = 29)
Average age	55.89 ± 15.55	45.05 ± 16.64	45.41 ± 16.51
F value	11.052		
p-value	<0.001		
COPD vs BA	p < 0.001		
COPD vs ACO	p = 0.005		
BA vs ACO	p = 0.995		

Table 4: Association of ACO with COPD severity grading

COPD severity	FEV1	ACO				Total	χ ² value	p-value
		Absent		Present				
Grade		No	%	No	%			
Mild	≥80	2	66.7	1	33.3	3	7.564	0.056
Moderate	50–79	51	83.3	10	16.7	61		
Severe	30–49	53	96.4	2	3.6	55		
Very severe	<30	6	100	0	0	6		

The mean age in COPD patients was 55.9 ± 15.5, while in asthma patients, it was 45.05 ± 16.64 and for ACO patients, the mean age was 45.41 ± 16.51. Statistical analysis revealed a highly significant relation such that asthma and ACO patients belonged to a younger age group and COPD patients were older (p-value < 0.001) (Table 2). Post hoc analysis done further consolidated these findings (Table 3).

Nevertheless, no correlation was found in the prevalence of asthma-COPD overlap and COPD severity grade (p-value 0.056) although out of 13, 10 ACO patients had moderate obstruction (Table 4). Similarly, no correlation was found between ACO and a history of biomass fuel exposure, smoking, family history of obstructive airway disease or past history of tuberculosis. No correlation was found between duration of symptoms and prevalence of ACO.

DISCUSSION

In 2017, the GINA and GOLD in a joint document on ACO, described ACO as persistent airflow limitation with several features associated with asthma and several features associated with COPD. Asthma-chronic obstructive overlap is characterized by the features that it shares both with asthma as well as with COPD. The significance of identifying patients with ACO lies in the fact that these patients have significantly more frequent exacerbations when compared with COPD patients.⁴ They are more symptomatic, with greater dyspnea and wheezing (but not greater cough and sputum) and overall physical activity is markedly reduced. The self-rated health of ACO patients is low and they have worse health-related quality of life as compared with COPD^{5,6} and especially with non-exacerbators with COPD.⁷ As a consequence, healthcare resources are consumed

2- to 6-fold more by ACO patients in comparison to asthma or COPD^{8,9} The principle rule for diagnosis of COPD, asthma, and ACO is based not only on history but also on symptoms and spirometry findings.

In previous epidemiological surveys, the reported prevalence rates of ACO overlap have ranged between 9 and 55%, with variation by gender and age. The wide range is a consequence of the various different criteria that have been used by different investigators. Concurrent doctor-diagnosed asthma and COPD has been reported to be in between 15 and 32% of patients with one or other diagnosis.³

The prevalence of ACO in our study was 14.5%. The prevalence in other studies conducted has shown variable results.¹⁰ In a study of 503 patients using GINA-GOLD guidelines conducted by Chandravanshi S et al., the prevalence of ACO was 16.3% which is comparable to the prevalence rate of the present study.¹¹ A similar study of 125 patients using the same guidelines conducted by Renthlei L et al. revealed the prevalence of ACO was 20%¹² while the study conducted in North East India in 164 patients, the prevalence of ACO was found in 22.6% patients.¹³

Asthma-chronic obstructive overlap estimated among COPD patients in the present study was 10.4% in contrast to 19.6%¹¹ and 21.8%¹³ seen in other studies conducted in India. In a study conducted in Japan in 38 centers in 2015, 1008 stable COPD patients were assessed and 328 out of the total 1008 (32.5%) had ACO as per GINA/GOLD report on ACO published in 2016 which is more than twice the percentage of ACO found in the present study.¹⁴ In another study of South Korea, 301 COPD patients were investigated and the prevalence of ACO was calculated. This study showed a prevalence of 31.3%, 11.9%, 48.3%, and 46.15% of ACO patients according to the modified Spanish, ATS Roundtable criteria, PLATINO and GINA/GOLD criteria, respectively.¹⁵ So it has been seen that the prevalence of ACO shows lot of variation depending on the diagnostic criteria applied on the study sample.

In another study conducted in a group of 831 COPD patients in Spain in 2016, ACO was diagnosed based on spirometry findings, history of asthma and blood eosinophil, and IgE counts. The diagnostic criteria used were different from that used in our study yet the results were similar.¹⁶ The prevalence of ACO was 15% in their study which is similar to the prevalence of 14.5% of ACO in our study.

The gender predilection and male predominance in ACO patients (p-value 0.001) seen in our study is in contrast to what was seen in the study conducted in North East India where 56.8% of the patients were females.¹³

In the present study, statistical analysis revealed that asthma and ACO patients belonged to a younger age group and COPD patients were older (p-value < 0.001). Post hoc analysis done further consolidated the findings which is in contrast to other studies where the mean age group of ACO patients was 51–60 and 63.6 ± 9.6 which is higher than that seen in this study.^{11,13}

This study helped us to diagnose patients of ACO who were mislabeled as either asthma or COPD and were being treated for the same. The strengths of our study were (1) the universally accepted and followed GINA/GOLD guidelines were used as a diagnostic criteria, (2) the association of ACO with COPD severity grading was done. Even though no significant correlation was found, 10 out of 13 patients did have moderate obstruction. The major limitation of the present study was that the sample size was small such that there is a possibility of a significant correlation of ACO with COPD severity grading if the study is replicated on a larger study sample.

CONCLUSION

Asthma-COPD overlap is much more prevalent and should be investigated for in all patients as it is underdiagnosed. Spirometry is necessary to confirm the diagnosis. It is usually found in patients aged 40–50 years of age and is seen more often among males and asthmatics. Such patients are treated as asthma, with inhaled corticosteroids.

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