



A study on asthma COPD overlap among patients diagnosed as asthma and COPD in tertiary care centre

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Abstract

Background: Asthma and Chronic Obstructive Pulmonary Disease (COPD) are major respiratory health problems. Asthma and COPD are typically characterized as different diseases with unique epidemiological features as well as pathophysiological mechanisms.

Methodology- The study was conducted at tertiary care centre from 1st December 2020 to 30th May 2021. Patients diagnosed with asthma or COPD presenting to Pulmonology OPD were included in the study. 100 patients fulfilling the inclusion criteria were included for the study and further divided into two groups i.e. 50 patients each with COPD and asthma were included in the group. These subjects were again categorized into only asthma, only COPD and ACO according to GOLD and GINA guidelines. Spirometry and radiological findings were recorded along with obstructive pattern and its reversibility after administering bronchodilator. The six-minute walking test was used to record the desaturation on exertion. **Result-** 18% of the subjects with asthma were diagnosed with ACO and 24% with COPD. Cough was most common presenting complaint in ACO, followed by expectoration, dyspnea and wheeze. Obstruction with FEV1/FVC less than 0.7 was seen in majority of the patients with ACO. **Conclusion-** The reversibility with bronchodilator was significantly higher than that of COPD group. The desaturation in study subjects on six minute walking test was significantly more in ACO. However, it was less compared to COPD group.

Keywords: Asthma, COPD, walking test, spirometry, respiratory.

Introduction:

Asthma and COPD are typically characterized as different diseases with unique epidemiological features as well as pathophysiological mechanisms. Asthma is an allergic disease that often develops during childhood, although it can also be diagnosed in adult life. It is characterized by airway hyper-responsiveness (AHR) that leads to

intermittent and usually reversible airway obstruction, whereas COPD is a chronic respiratory disease that is typically linked to smoking tobacco, usually presents in subjects older than forty years of age, and is characterized by progressive and irreversible airway obstruction. These definitions allow asthma and COPD to be recognized as distinct disease entities. However, this concept needs to be re-evaluated as many epidemiological studies have shown that asthma and COPD may coexist, or at least one condition may evolve into the other creating a condition commonly described as Asthma and COPD Overlap Syndrome (ACOS). It is a syndrome where older adults with a significant smoking history have features of asthma in addition to their COPD.¹⁻² Although, the exact definition regarding the syndrome remains ambiguous as it is characterized by functional and pathological overlap between asthma and COPD. In the documents developed by science committee of Global Initiative for asthma (GINA) as well as Global Initiative for Chronic Obstructive Lung Disease (GOLD), ACOS was defined as syndrome characterized by persistent airflow limitation with several features usually associated with asthma and certain features generally associated to COPD. This overlap makes the differentiation between COPD and asthma with persistent airflow limitation difficult, especially in smokers and elderly adults. Hence, the above study was conducted to understand the ACO among asthmatics and COPD patients.

Materials And Methodology

Study place- The study was conducted at Pulmonology OPD of tertiary care centre from 1st December 2020 to 30th May 2021.

Study Design- Cross-sectional analytical study.

Inclusion criteria- Patients aged over 18 years diagnosed with asthma or COPD, ready to give consent were included.

Exclusion criteria- Patients with other respiratory co-morbidities like acute exacerbation of asthma, bronchiectasis, pulmonary TB sequelae, lung malignancy, interstitial lung disease, and unwilling to give consent for participation were excluded.

Sample size- 100 patients diagnosed with asthma or COPD were taken into consideration. Further, they were divided into two groups of patient's i.e 50 patients in each with asthma and COPD.

Data analysis- The data was entered in Microsoft Excel and analyzed in SPSS. Continuous variables were expressed as means and categorical variables as proportions. The difference in means was seen using T-test and proportions using chi-square test.

Ethical considerations- The study was conducted after receiving clearance from Institutional ethics committee. Written informed consent was obtained from the patients in their local language.

The data regarding the age, gender, treatment history was collected from the patients. Spirometry and radiological findings were recorded. The obstructive pattern and its reversibility after administering bronchodilator was recorded. The six-minute walking test was used to record the desaturation on exertion.

Results

Table 1: Primary Diagnosis of Study Subjects P – 0.04

Age	Asthma	COPD
	N(%)	N(%)
ACO	9	12
No ACO	41	38
Total	50	50

Table. 1 shows diagnosis of ACO in patients of COPD and asthma. ACO was diagnosed in 18% of asthma patients and 24% of COPD patients.

Table 2: Age Distribution According to Diagnosis (p – 0.02)

Age	Asthma(41)	COPD (38)	ACO(21)
18-30(25)	20	2	3
31-50(25)	14	7	4
51-70(35)	3	22	10
More than 70(15)	4	7	4

Table 2. shows the age distribution of study subjects based on the diagnosis. ACO was found to be high significantly more among the 18-30 age group.

Table 3: Symptoms According to Diagnosis

Symptoms	Asthma(41)	COPD(38)	ACO(21)
Cough(49)	14	22	13
Expectoration(29)	1	19	9
Wheeze (34)	7	22	5
Dyspnea(27)	10	13	7
Ankle Edema(17)	3	9	5

Table 3. shows the presenting symptoms of the study subjects according to the diagnosis. Cough was the most common presenting complaint followed by expectoration, dyspnea and wheeze.

Table 4: Risk Factors According to Diagnosis

Symptoms	Asthma(41)	COPD(38)	ACO(21)
Diabetes (17)	6	7	3
Hypertension (19)	5	9	5
Family history (27)	17	2	8
Atopy (18)	14	1	3
Allergic rhinitis (21)	13	5	3
Sleep apnea (22)	9	7	6
Smoking (36)	2	29	7

The above table shows risk factors contributing for the ACO. Smoking was found to be the prominent factor.

Table 5: Risk Factors According to Diagnosis

	Asthma	COPD	ACO
	Mean + SD	Mean + SD	Mean + SD
Age of Onset	12 + 3.3	42 + 11.1	46.4 + 4.1
Duration of Disease	22 + 4.4	9.4 + 3.2	11.3 + 5.1

The mean age of onset according to disease was shown in the above table. In ACO it was 46.4 years, higher than asthma and COPD.

Table 6: Current Treatment Regime

TREATMENT REGIME	ASTHMA	COPD
ICS only	4	
SABA only		1
ICS+LABA	26	6

ICS+LABA+LAMA	8	41
ICS+LABA+MONTELUKAST	8	2

Table 6. shows current treatment regimen in study subjects of asthma and COPD. Majority of subjects with asthma were started in ICS+LAMA whereas in case of COPD, majority were on ICS+LABA+MONTELUKAST

Table 7: X-ray Findings in Study SubjectsP – 0.08

	Asthma (41)	COPD (38)	ACO (21)
Normal	29	11	7
Hyperinflation	7	22	9
Others	5	5	5

Table 7. shows radiological pattern in study subjects. Hyperinflation was seen in COPD and ACO patients but difference was not statistically significant

Table 8: Presence of Obstruction in Study SubjectsP – 0.05

	Asthma	COPD	ACO
FEV1/ FVC > 0.7	12	14	9
FEV1/ FVC < 0.7	29	24	12

Table 8. shows presence of obstructive pattern in study subjects. The difference in the obstructive pattern between two groups was not statistically significant.

Table 9: Reversibility of Obstruction in Study Subjects with Bronchodilator

	Asthma (41)	COPD (38)	ACO (21)
>80% FEV1	8	9	7
50-80% FEV1	23	11	8
30-50% FEV1	7	9	5
<30% FEV1	3	7	1

Table 9. shows the reversibility of obstruction after use of bronchodilator in the study subjects. Reversibility was more for ACO group compared to COPD group.

Table 10: Desaturation on Six Minute Walking Test

	Asthma	COPD	ACO
<4%	36	26	17
>4%	5	12	4

The above table shows the desaturation in study subjects after 6 minute walking test. The desaturation in ACO subjects was not significantly different from that of COPD patients.

Discussion

In the present study, asthma-COPD-overlap was reported in older individuals. One third of the subjects aged around fifty and one fourth of the subjects aged seventy and over half of the subjects aged over seventy showed asthma-COPD-overlap. Since chronic obstructive pulmonary disease occurs late, it is likely that asthma-COPD-overlap is seen in older age group than those in younger age group, who are more likely to have asthma alone. In a study by Ayub et al, the mean age of subjects with ACOS was reported to be 61.8 years whereas that in subjects without ACOS was reported to be 63.5 years. There was no significant difference between the mean ages of subjects of both groups.³ K Kumar et al reported that the mean age of presentation of study subjects with ACO was 57.9 years. The study also reported that the mean duration of disease was 8.62 years.⁴ Guerriero in Italy reported a cross sectional study in general population to determine the prevalence of

asthma, COPD and ACO. The mean age of subjects with ACO in that study was reported to be 57.2 years.

In the present study, 21% patients were found to have asthma-COPD overlap. Among asthmatics, eighteen percent of the patients with asthma were found to have asthma-COPD overlap. In patients with COPD twenty four percent of the subjects were found to have asthma-copd overlap. Ayub et al reported that among the patients with obstructive pattern, ACOS was reported in 45%, since they had significant reversibility with bronchodilator. K Kumar et al reported that ACO was diagnosed in 16.3% of the study subjects with chronic obstructive airflow pattern in spirometry.⁴

In this study, cough was the most common symptom reported among subjects with asthma-COPD-overlap. Out of a total of twenty one percent study subjects with asthma-COPD-overlap, thirteen percent reported cough. This was followed by expectoration, which was reported by nine percent of study subjects. This was followed by shortness of breath, wheeze and ankle edema. Eikerjlung et al reported that respiratory symptoms were reported more in patients with ACO compared to those with asthma-only or COPD-only. 38.3% of the subjects with ACO which was significantly higher than reported in asthma-only and COPD-only groups. In the present study, the most common symptom reported by subjects with ACO was cough, followed by expectoration and dyspnea. Wheeze and ankle edema were the least commonly reported symptoms.

Out of twenty one subjects diagnosed with asthma-COPD-overlap, most common risk factor was family history of asthma or COPD. This was followed by smoking which was seen in one-third of the patients with asthma-COPD overlap. Hypertension was seen in almost one fourth of the subjects. Henriksen reported smoking as a major risk factor for ACO, stating that a total of 70.6% of the subjects in ACO group were current or past smokers. Another interesting risk factor reported by Henriksen was lack of physical activity. Physical activity was present only in 14% of the subjects with ACO. In the present study, the most common risk factors for ACO included smoking, family history and sleep apnea. This was followed by hypertension, diabetes and allergic rhinitis.

In the present study, obstruction pattern with FEV1/FVC of less than 70% was seen in most of the study subjects. The reversibility with bronchodilator was much better in the ACO group in the present study, compared to the COPD-only group. Ayub et al did not report any significant difference in the spirometry findings of the two groups except with respect to FVC absolute volume and FVC% predicted values. The FEV1/FVC was reported to be 57.8 in ACOS group and 57.3 in non-ACOS group which was not significantly different. However, the percentage reversibility with bronchodilator was reported to be 23.6% in ACOS group and 2% in non-ACOS group which was highly significant statistically. K Kumar et al reported that the mean change in FEV1 after bronchodilator was significantly greater in ACO compared to non-ACO group.⁴

Hyperinflation was noted in 42% of the subjects with ACO in our study. However this was significantly lower than that in COPD-only group. K Kumar et al reported that patients with COPD had a significantly higher degree of hyperinflation of their lung fields. It also reported that the patients with ACO had lower proportion of emphysema than those with COPD. The study also reported the vascular attenuation and distortion were significantly higher in those with COPD compared to ACOS.⁴

Conclusion

Majority of the patients were aged over 50 years. ACO was diagnosed in 18% of the patients with asthma and 24% of the subjects with COPD. In contrast to asthmatics, COPD and ACO were reported more in subjects aged over 50-years. Cough was most

common presenting complaint in ACO, followed by expectoration, dyspnea and wheeze. The most common risk factors for ACO were smoking and family history. The age of onset of ACO was significantly higher than that of asthma and not so higher compared to COPD. Hyperinflation was seen in majority of the subjects with ACO and COPD. Obstruction with FEV1/FVC less than 0.7 was seen in majority of the patients with ACO. However this proportion was smaller than that of patients with COPD. The reversibility with bronchodilator was significantly higher than that of COPD group. The desaturation in study subjects on six minute walking test was significantly more in ACO. However, it was less compared to COPD group.

Limitations of the study

Since the study subject are already diagnosed with asthma or COPD, there is likely skewness of proportion of subjects with ACO. The compliance to medication of study subjects could not be fully verified.

References

1. Alshabanat A, Zafari Z, Albanyan O, Dairi M, FitzGerald JM. Asthma and COPD overlap syndrome (ACOS): a systematic review and meta-analysis. *PloS one*. 2015 Sep 3; 10(9):e0136065.
2. Gibson PG, Simpson JL. The overlap syndrome of asthma and COPD: what are its features and how important is it? *Thorax*. 2009 Aug 1; 64(8):728-35.
3. Ayub II, Arshad AM, Sekar P, Manimaran N, Thangaswamy D, Chockalingam C. Predictors of asthma-chronic obstructive pulmonary disease overlap syndrome in patients with chronic obstructive pulmonary disease from a tertiary care center in India. *Lung India: Official Organ of Indian Chest Society*. 2018 Mar; 35(2):137.
4. Kumar K, Gupta PP, Verma AK, Yadav R. Assessment of prevalence and characteristics of asthma-COPD overlap among patients with chronic airflow obstruction. *Monaldi Archives for Chest Disease*. 2022 Sep 2.
5. Guerriero M, Caminati M, Viegi G, Senna G, Pomari C. Prevalence and features of asthma-chronic obstructive pulmonary disease overlap in northern Italy general population. *Journal of Asthma*. 2019 Jan 2; 56(1):27-33.
6. Ekerljung L, Mincheva R, Hagstad S, Bjerg A, Telg G, Stratelis G, Lötval J. Prevalence, clinical characteristics and morbidity of the asthma-COPD overlap in a general population sample. *Journal of Asthma*. 2018 May 4; 55(5):461-9.
7. Henriksen AH, Langhammer A, Steinshamn S, Mai XM, Brumpton BM. The prevalence and symptom profile of asthma-COPD overlap: the HUNT study. *COPD: Journal of Chronic Obstructive Pulmonary Disease*. 2018 Jan 2; 15(1):27-35.