ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

CHARACTERISTIC FEATURES AND PERCENTAGE OF ASTHMA CHRONIC OBSTRUCTIVE PULMONARY DISEASE OVERLAP AMONG PATIENTS WITH OBSTRUCTIVE AIRWAY DISEASES

Dr Raju. Ch[1], Dr M. Ravindranath[2]

[1]Associate Professor, Maheshwara Medical College, Hyderabad
[2]Associate Professor, Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad.
Corresponding Author: Dr M. Ravindranath, Associate Professor, Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad.

Abstract

Introduction: The obstructive lung diseases (OLDs), asthma, and chronic obstructive pulmonary disease (COPD) are common and are associated with substantial morbidity. Both diseases are characterized by airflow limitation and chronic airway inflammation. In asthma, the airflow limitation is, similar to the symptoms, variable and in most cases reversible either spontaneously or following treatment, eg, in response to a bronchodilator. In contrast, the airflow limitation in COPD is, by definition, persistent and often progressive and may be associated with chronic cough and sputum production, and, with increasing severity, also exacerbations and comorbidities.

Material and Methods: This is a prospective and non-interventional study was conducted in the Department of Respiratory Medicine at Tertiary care teaching Hospital from November 2019 to October 2020. We included 65 patients with chronic airway diseases who were classified into three group from (ACO, asthma and COPD). Asthma (according to GINA guidelines) and another diagnosed as COPD (according to GOLD guidelines) with the exclusion of patients aged below 18 years, having any other respiratory diseases (as interstitial lung disease, obstructive sleep apnea, bronchiectasis, cardiogenic pulmonary congestion and pneumonia) or refused to give a written informed consent.

Results: This study was conducted on 65 patients with chronic airway diseases (COPD, asthma and asthma COPD overlap) were selected. It included 52 (80 %) males and 13 (20%) females. Among the studied participants, 26 (40%) patients were diagnosed as having ACO, 16 (24.61%) patients were diagnosed as having asthma and 23 (35.3%) patients as having COPD. Regarding the age difference between groups, it was found that patients who were diagnosed as having ACO were older than asthmatic patients with mean age of 51.43±6.34 and 39.52±4.23 years, respectively. The men age of patients with COPD was 54.25±6.27 which was older than both ACO and asthmatic patients.

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Conclusion: The current available studies suggest that patients with ACOS have more symptoms, more exacerbations, and also comorbidity compared to asthma- and COPD patients, which all are likely to indicate a worse outcome. These individuals have more chronic disease comorbidities than individuals with COPD alone.

Keywords: Asthma, Chronic obstructive pulmonary disease, Obstructive airway diseases

Introduction

The obstructive lung diseases (OLDs), asthma, and chronic obstructive pulmonary disease (COPD) are common and are associated with substantial morbidity. Both diseases are characterized by airflow limitation and chronic airway inflammation. [1] In asthma, the airflow limitation is, similar to the symptoms, variable and in most cases reversible either spontaneously or following treatment, eg, in response to a bronchodilator. [2] In contrast, the airflow limitation in COPD is, by definition, persistent and often progressive and may be associated with chronic cough and sputum production, and, with increasing severity, also exacerbations and comorbidities. [3] However, when examining an individual patient with symptoms of OLD, it may be difficult to reach a final diagnosis, especially in the elderly, because patients may present features characteristic for both asthma and COPD. [4]

So far, the important question remains largely unanswered whether the overlap between asthma and COPD represent patients with coexisting asthma and COPD or a unique disease entity. Some publications emphasize that the asthma– COPD overlap syndrome (ACOS) should be regarded as an independent disease entity, although no agreement on definition has been reached so far. [5] In a Spanish consensus paper from 2012, the participating specialists in pulmonary medicine agreed upon criteria for the “overlap phenotype COPD-asthma” and accepted it as a unique clinical phenotype. [6] Furthermore, the Spanish consensus paper and the very recently published Finnish COPD guidelines point, similar to a study by Kitaguchi et al to paraclinical findings suggesting eosinophil airway inflammation, including higher peripheral and sputum eosinophil counts and elevated exhaled nitric oxide in patients with ACOS or asthma-like COPD. [7]

The outcome of a very recent collaboration between the Global Initiative for Asthma (GINA) and Global Initiative for Chronic Obstructive Lung Disease (GOLD) are dealing with a clinical description of ACOS. [8] The document describes the syndrome as having shared features with both asthma and COPD together with nonreversible airflow limitation, although at the same time emphasizing that the document is intended only for clinical work and not to be used as a definition of ACOS. [9]

The proportion of patients suffering from OLD that may be classified as having ACOS varies between studies, depending on the definition, but in recent publications, it has been estimated to be 15%–25%. [10] Further knowledge, not least with regard to clinical characteristics and risk factors, of ACOS is, therefore, clearly needed and might lead to a generally accepted definiti

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Material and Methods

This is a prospective and non-interventional study was conducted in the Department of Respiratory Medicine at Tertiary care teaching Hospital from November 2019 to October 2020. We included 65 patients with chronic airway diseases who were classified into three group from (ACO asthma and COPD).

Asthma (according to GINA guidelines) and another diagnosed as COPD (according to GOLD guidelines) with the exclusion of patients aged below 18 years, having any other respiratory diseases (as interstitial lung disease, obstructive sleep apnea, bronchiectasis, cardiogenic pulmonary congestion and pneumonia) or refused to give a written informed consent. In all procedures, we strictly followed the faculty ethics committee standards.

In the three groups, group I (ACO patients), group II (asthma patients) and group III (COPD patients), every patient was subjected to the following: (1) history taking and clinical assessment, (2) plain X-ray and computed tomography of the chest (to exclude other respiratory diseases), (3) spirometry, forced vital capacity (FVC) procedure, and bronchodilator reversibility test (BDR) that were done according to ATS/ERS task force standards, (4) sputum eosinophil counting.

Statistical analysis

The statistical analysis was done using IBM SPSS software package version 25. Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation, and median. Significance of the obtained results was judged at the 5% level.

Results

This study was conducted on 56 patients with chronic airway diseases (COPD, asthma and asthma COPD overlap) were selected. It included 52 (80 %) males and 13 (20%) females Table 1.

Table 1 Sex distribution among the study group

	Frequency	Percent
Females	13	20
Males	52	80
Total	65	100

Table 2 Classification of study groups based on final diagnosis

	Frequency	Percent
ACO	26	40
Asthma	16	24.61
COPD	23	35.3
Total	65	100

ACO: Asthma chronic obstructive pulmonary disease overlap;

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

COPD: Chronic obstructive pulmonary disease.

Among the studied participants, 26 (40%) patients were diagnosed as having ACO, 16 (24.61%) patients were diagnosed as having asthma and 23 (35.3%) patients as having COPD (Table 2).

Table 3 Age differences between the study group

	Frequency	Mean±SD
ACO	26	51.43±6.34
Asthma	16	39.52±4.23
COPD	23	54.25±6.27

Regarding the age difference between groups, it was found that patients who were diagnosed as having ACO were older than asthmatic patients with mean age of 51.43±6.34 and 39.52±4.23 years, respectively. The men age of patients with COPD was 54.25±6.27 which was older than both ACO and asthmatic patients (Table 3).

Table 4 Comparison of studied groups regarding history of atopy

Atopy	ACO (n=26)	Asthma (n=16)	COPD (n=23)
No			
Count	11	3	18
%Within diagnosis	47.2	18.75	78.2
Yes			
Count	15	13	5
%Within diagnosis	61.53	81.25	21.7

Table 4 showed the comparison of groups regarding history of atopy. We found that 61.53% of ACO group, 81.25% of asthma group and 21.7% of COPD group had a positive history of atopy.

Table 5 Comparison of study groups regarding sputum eosinophils

Sputum eosinophils	ACO (n=26)	Asthma (n=16)	COPD (n=23)
Negative			
Count	19	13	19
%Within diagnosis	73.07	81.25	82.60
Positive			
Count	7	3	4
%Within diagnosis	26.92	18.75	17.39

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

We found that 73.07% of ACO group, 81.25% of asthma group and 82.60% of COPD group had a positive history of atopy. Comparison of study groups regarding sputum eosinophils revealed that 26.92% of ACO group, 18.75% of asthma group and 17.39% of COPD group had positive sputum eosinophils (Table 5).

Discussion

In this study, we compared the demographic characteristics, comorbidities, and ED visit/hospitalization experience among three groups of individuals with physician-diagnosed obstructive lung disease over the age of 35 years in the general U.S. population and control subjects. This study confirms the work of others that ACOS is a common condition, with 3.2% of individuals reporting both COPD and asthma diagnoses given by health professionals. Although the PLATINO study reported a lower prevalence of ACOS (1.8%) in Central and South American cohorts [11], an Italian study reported a prevalence of 4.5% [12]. Regardless, all of these studies suggest that ACOS needs additional research, because this condition is common [13] and these individuals are not enrolled in current studies of asthma or COPD [14] and appear from our work to have worse outcomes. Studies often exclude the elderly from asthma studies and younger subjects from COPD studies and rarely enrol subjects with both diseases.

We also show that the absolute prevalence of ACOS and COPD increases with age up to 85 years. In contrast, the relative prevalence of ACOS decreases with age, and the relative prevalence of COPD alone increases with age. This decline in relative prevalence is due to growth of the COPD cohort at a rate that exceeds ACOS population growth or an excess in ACOS death rates. More ED visits and hospitalizations for ACOS than COPD in this study support the latter. Because previous diagnoses of asthma are common in individuals with COPD [14], these higher rates of ACOS in the aging population [15] will likely continue as smoking prevalence declines, although patients with ACOS smoke at similar rates to patients with COPD. Importantly, this study had an emphasis on a current diagnosis of asthma in addition to a healthcare provider asthma diagnosis to define the ACOS cohort rather than a remote asthma history alone.

The most important finding from our study is that the ACOS population has an increased number of comorbidities and prevalence of hospitalization/ED visits than the COPD-alone cohort. One goal of our study was to define the disease burden that might inform opportunities for improved therapy [16]. Although others have suggested that hospitalizations and comorbidities are important in the ACOS population, the increased burden of comorbid disease across many different organ systems over and above that of COPD is surprising. [17]

One common factor associated with COPD comorbidities in some other studies is obesity [18]. Although we attempted to control for body mass index in our analyses, the ACOS population in this study still had a higher prevalence of obesity and morbid obesity, which may have influenced arthritis and diabetes risks. However, we cannot disprove that the systemic

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

inflammatory burdens or respiratory mechanics associated with obesity could drive some of the diagnosis of obstructive lung disease and presence of other comorbidities. [19]
The reasons for increased hospitalization and ED visits are likely due to more frequent or severe exacerbations of obstructive lung disease resulting in poor quality of life. [20] However, the other feature that is prominently shown by the current data is the marked difference in demographic characteristics regarding health behaviors, disability, poverty, and poor access to healthcare that prompt use of the ED for primary care.

A study in Medicaid patients found that the patients with ACOS have higher utilization rates for healthcare services than the patients with either disease alone. [21] The additional expenditures in healthcare have important implications for public health, because ACOS results in consumption of two- to sixfold more healthcare resources than asthma or COPD alone. [22] A prior study in one state's BRFSS also showed higher rates of ED visits and hospitalizations for patients with ACOS. [23] Whether improved continuity of care may reduce avoidable hospitalizations in such patients remains to be proven, because it remains unknown whether hospitalization is primarily due to more severe disease or financially driven poor treatment compliance. [24]

Populations with disparities have higher levels of both cigarette smoking and other environmental factors, such as biomass fuel exposure, that can exacerbate asthma independent of cigarette smoke [25]. In our study, a greater portion of subjects with ACOS were never smokers than in the COPD- or asthma-only groups. It is also known that exposure to occupational or domestic airborne pollutants may contribute to a higher prevalence of asthma and COPD among nonsmokers [26]. Golpe and colleagues observed that ACOS was commonly caused by biomass exposures compared with smoking-related COPD in the Spanish population (21.3 vs. 5%; $P < 0.001$) [27]. Furthermore, other genetic and *in utero* exposures are also known to contribute to lung function impairment associated with obstructive lung disease, which may begin as early as before birth [28]. Therefore, the demographic characteristics of the ACOS population help inform future directions for research in this important phenotype of obstructive lung disease.

Conclusion

The current available studies suggest that patients with ACOS have more symptoms, more exacerbations, and also comorbidity compared to asthma- and COPD patients, which all are likely to indicate a worse outcome. These individuals have more chronic disease comorbidities than individuals with COPD alone. Future ACOS research will need improved definitions, diagnostic tools, further understanding of the pathophysiological mechanisms, and trials of targeted therapies. Longitudinal studies are needed to determine and better quantify the prevalence of ACOS-related comorbidities to improve quality of life.

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

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