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Role of Aspergillus fumigatus Sensitization in Patients with Asthma-COPD Overlap Compared to Asthma Patients

Thesis

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Abstract

Background: Distinguishing asthma from COPD can be difficult especially among old age and smokers. Some patients have common features of asthma and COPD**.**[1] **(GINA, 2018).** Hence, the definition of asthma COPD overlap (ACO) was developed. ACO is a considerable risk factor for healthcare utilization versus the general population, the asthma population and the COPD population.[2] **(Minchul Kim et al., 2019).** Fungal sensitization increase severity of asthma.

Aim of the study: To compare the prevalence of aspergillus fumigatus sensitization among ACO patients versus asthmatic patients and healthy normal control.

Patients and Methods: 90 individuals were included; 30 diagnosed as bronchial asthma (According to GINA 2018), 30 ACO patients and 30 healthy normal control. All are group matched to age and sex and selected from the allergy and chest outpatient clinics at Ain shams University hospitals. Total IgE, skin test for Aspergillus and spirometry were done to all participants.

Results: Aspergillus sensitization was more prevalent among ACO group compared to asthma group however, all control individuals were negative to aspergillus. FEV1 was significantly lower among ACO and asthma groups when compared to control. FEV1 increased significantly in the three groups after albuterol inhalation.

Conclusion: sensitization to Aspergillus was more among ACO patients compared to Asthma and control groups.

KEYWORDS: Asthma, Asthma-chronic obstructive pulmonary disease overlap (ACO), Fungal sensitization.

List of Abbreviations

Abbr.	Full term
ABPA	Allergic Broncho Pulmonary Aspergillosis
ACO	Asthma- COPD Overlap
ADAM33	A Disintegrin and Metalloprotease Domain
AGR	Arabian Gulf region
AHR	Airway hyper responsiveness
AR	Allergic rhinitis
ASM	Altered Smooth Muscles
Asp	Aspergillus
ATS	American Thoracic Society
AAFS	Asthma associated to fungal sensitization
BA	Bronchial Asthma
CBC	Complete Blood Count
COPD	Chronic obstructive pulmonary disease
ELISA	Enzyme Linked Immunosorbent Assay
EDTA	Ethylendiamine tetra acetic Acid
ERS	European Respiratory Society
FEV1	Forced expiratory volume in first second
Fig	Figure
FVC	Forced vital capacity
GINA	Global initiative for asthma
GOLD	Global Initiative for Chronic Obstructive Lung Disease
HMGB1	high mobility group box-1 protein
ICS	Inhaled corticosteroids
IgE	Immunoglobulin E
IL	Interleukin

IQR ..... Interquartile range

IU ..... International unit

KIT..... KIT proto-oncogene receptor tyrosine kinase

LABA ..... Long acting beta$_2$ agonists

LAMA ..... Long-acting muscarinic antagonist

LTRA ..... Leukotrienes receptor antagonist

LNN.....Lower Limit of Normal

NADPH.....Nicotinamide adenine dinucleotide phosphate

NO ..... Nitric oxide

OCS ..... Oral corticosteroids

PRRs..... Pattern Recognition Receptors

PEF ..... Peak expiratory flow

PFT ..... Pulmonary function test

SAFS ..... severe asthma with fungal sensitization

SABA ..... Short acting beta agonists

SD ..... Standard deviation

sIgE ..... Specific immunoglobulin E

SNPs .....Single-nucleotide polymorphisms

SPSS ..... Statistical package for Social Science

SPT ..... Skin prick test

TH2 high ..... T helper 2 high cell

TNF ..... Tumor necrosis factor

WHO ..... World health organization

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INTRODUCTION

Severe obstructive lung disease, which encompasses patients with asthma, chronic obstructive pulmonary disease (COPD) or features of both, remains a considerable global health problem and burden on healthcare resources. However, the clinical definitions of severe asthma and COPD do not reflect the heterogeneity within these diagnoses or the potential for overlap between them, which may lead to inappropriate treatment decisions. ***(Martin et al., 2019)***

Most studies exclude patients with diagnoses of both asthma and COPD. Clinical definitions can influence clinical trial design and are both influenced by, and influence, regulatory indications and treatment recommendations. ***(Martin et al., 2019)***

Asthma is a heterogynous disease usually characterized by chronic airway inflammation. It presents clinically by symptoms of chest tightness, dyspnea, cough and wheeze that vary over time and in intensity together with variable expiratory airflow limitation. ***(GINA, 2018).***

Chronic Obstructive Pulmonary Disease (COPD) is a common preventable and treatable disease that is, characterized by persistent respiratory symptoms and airflow

limitation that is due to airway and/or alveolar abnormalities, which is caused by significant exposure to noxious particles or gases**.** ***(GOLD, 2019).***

Distinguishing asthma from COPD can be difficult especially among old age and smokers. Some patients have common features of asthma and COPD**.** ***(GINA, 2018).*** Hence, the definition of asthma COPD overlap (ACO) was developed.

ACO is a considerable risk factor for healthcare utilization versus the general population, the asthma population and the COPD population. Consequently, future focus should be placed on the ACO population to identify ways to reduce their healthcare utilization. ***(Minchul Kim et al., 2019).***

Fungal sensitization is defined as the presence of immediate cutaneous hyper reactivity to fungal antigen(s) or an increase in specific IgE antibodies to a particular fungus. ***(Agarwal and Gupta, 2011).***

Evidence has mounted that fungal sensitization is associated with a more severe asthma phenotype. ***(Fairs et al., 2010).*** Thus, an important identifiable subgroup of asthma, termed severe asthma with fungal sensitization