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Frequency of Eosinophilia in Patients with Bronchial Asthma in Khyber Pakhtunkhwa

Mohammad Yasin^{1✉}, Muhammad Adeel¹, Mumtaz Muhammad², Samrina Sadaf³,
Sanaulah Tareen⁴, Faheem Jan⁵

¹Department of Pulmonology, Ayub Medical College, Abbottabad - Pakistan ²Post graduate Medical Institute Hayatabad, Peshawar - Pakistan ³Intensive Care Unit, Agha Khan Medical Centre, Gilgit - Pakistan ⁴Fatima Jinnah Chest Disease Institute, Quetta - Pakistan ⁵Programmatic Management of Drug Resistant TB Unit, Ayub Medical College and Teaching Hospital, Abbottabad - Pakistan

Corresponding Author

Mohammad Yasin

Department of Pulmonology,
Ayub Medical College,
Abbottabad – Pakistan
E-mail:
yasinmohammadjan@yahoo.com

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ABSTRACT

Background: Asthma is a very common disease throughout the world. Among various types of asthma eosinophilia is one of the important factors to be considered in deciding management protocols. Different types of asthmatic patients can have varying levels of eosinophilia. We wanted to see if age can have any effect on the prevalence and level of eosinophilia in asthmatic patients.

Objective: Objective of the present study was to determine the frequency of eosinophilia in bronchial asthma patients of different age groups.

Methodology: This cross-sectional study was performed at Pulmonology Department of Ayub Teaching Hospital Abbottabad Pakistan from February 2019 to July 2019 on 116 patients. All new cases presented with bronchial asthma of age 20-70 years were enrolled. Detailed history and clinical examination followed by spirometry was done. Each patient's blood eosinophils count was performed at hospital laboratory and values were recorded. Data was analyzed with SPSS version 24.

Results: Mean age of the patients was 41 years \pm 11.02. Patients of age 20-40 years were 56 (48%) and of age 41-70 years were 60 (52%). Males were 79 (68%) and females were 37 (32%). Mean weight was 65Kgs \pm 12.73. Family history of asthma was positive in 77 (66%) patients and was negative in 39 (34%) patients. Seventy one (61%) patients had eosinophilia while 45 (39%) patients didn't have eosinophilia. We found no significant differences regarding eosinophilia among different age and gender groups.

Conclusion: Eosinophilia is prevalent in a majority of bronchial asthma patients. There is no significant difference in eosinophilia among different adult age groups.

Key words: Eosinophilia; Bronchial asthma; Pulmonology

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Introduction

Asthma is one of the top non communicable diseases, which affects both children and adults globally. In 2019 its prevalence has been reported as around 262 million cases with approximately 461000 deaths.¹ It is considered as a serious health problem throughout the world. It is a disease of all age groups and upto one fifth of both adults and children are affected.^{2,3} As per the Center for Disease Control (CDC), the asthma epidemic is on the rise which creates an immense economic burden of approximately \$54 billion USD annually from lost school and work days, medical costs and early deaths.⁴

Asthma is a chronic inflammatory disorder of the airways which clinically manifests with the symptoms of recurrent cough, wheezing, breathlessness and chest tightness. There is bronchial hyper-responsiveness and variable airflow obstruction. The symptoms are often reversible either spontaneously or with treatment.² Bronchial asthma is diagnosed by proper history and examination supplemented by spirometry.²

Asthma is a heterogeneous disorder and its several clinical phenotypes have been described. Various forms of asthmatics can present with different levels of severity, natural history and responses to treatment. This has made the search for better understanding of the disease an important problem for the investigators. Some evidence from clinical studies suggests that classification of asthma on the basis of some inflammatory characteristics are of great help in order to optimize therapy. Therefore it is suggested that the knowledge of inflammatory biomarkers should be utilized in identifying various types of asthmatic patients and monitoring of disease in clinical practice.⁵ A special phenotype known as the "eosinophilic phenotype" is studied to have persistent eosinophilic inflammation in their airways with resultant frequent exacerbations.⁶ A well-defined asthma phenotype known as "late-onset eosinophilic asthma" is considered to have a different pathology in contrast to classical childhood-onset, allergic asthma.⁷ Studies suggest that sputum eosinophilia is found in less than half number of patients with asthma and it is reported that these patients usually have more severe disease and are difficult to treat with worse outcome.⁸ Peripheral blood eosinophilia correlates with clinical and physiological features of asthma such as symptoms and bronchial hyperreactivity.⁹ Patients with "adult-onset asthma" with a high blood eosinophils count ($\geq 0.3 \times 10^9$ per L) have been described to have a distinct phenotype of severe asthma having more frequent exacerbations and poorer prognosis.¹⁰

Eosinophilic asthma mostly affects adults of 35-50 years age, although sometimes older adults and children also can present with this type of disease. In a study done in

India by Kumar et al, eosinophilia was present in 58% of bronchial asthma patients.¹¹ In another study done in USA by Hasegawa et al the prevalence of serum eosinophilia in hospitalized bronchial asthma patients was 40%.¹² Eosinophilia is a risk factor in the management of patients with asthma, indicating deterioration and exacerbation.¹³ The variation in eosinophilia among different adult age groups have not been thoroughly studied in recent local literature and this scarcity of studies prompted us to investigate this problem. By properly assessing and treating bronchial asthma at an earlier stage we will be able to achieve its timely control and reduction of its severe and fatal exacerbations to a considerable extent and in this way we will endeavour to reduce the burden of bronchial asthma. This study was conducted with the aim to determine the frequency of eosinophilia in Bronchial asthma patients

Methodology

This cross-sectional study was conducted at a tertiary care hospital of Pakistan from February 2019 to July 2019. One hundred and sixteen patients were enrolled through consecutive non probability sampling. Patients with age 20-70 years having bronchial asthma were included while patients with coexisting chronic obstructive pulmonary disease (COPD), allergic bronchopulmonary aspergillosis (ABPA), Churg Strauss syndrome and eosinophilic pneumonias and patients taking oral corticosteroids regardless of duration were excluded.

Approval from institutional ethical committee was obtained for conducting the study. An informed written consent was taken from all participants. Detailed history was taken from all patients followed by clinical examination. Spirometry was performed on all patients. Patients were assessed by the researcher by measuring their blood eosinophils count at hospital laboratory and values were recorded. All the above mentioned information including age, gender, and family history of asthma and blood eosinophil count were recorded on a proforma.

The data was analysed using SPSS version 24. Quantitative variables like age and weight were described as Mean \pm Standard deviation. Categorical variables like gender, family history and eosinophilia was calculated as frequencies and percentage. Eosinophilia was stratified among age and gender. Data was presented in tables and charts.

Results

Among total 116 patients 48% (n=56) were of age 20-40 years and 52% (n=60) were of age 41-70 years. Mean age of the participants was 41 years \pm 11.02. Males were 68 % (n=79) and females were 32 % (n=37). Family history was positive in 66% (n=77) patients. A total of 61 % (n=71)

Table 1. Stratification of eosinophilia with age

Eosinophilla	20-40 years	41-70 years	Total	P-Value
Yes	34	37	71	0.9162
No	22	23	45	
Total	56	60	116	

patients were found to have eosinophilia. Stratification of eosinophilia with different age groups and gender revealed no significant differences among different age and gender groups (p values of 0.9162 and 0.8851 respectively) (table 1, 2).

Discussion

This study revealed that 61% (n=71) patients with asthma had eosinophilia. It also revealed that there is no difference in eosinophilia among different age groups. Different investigators have demonstrated various results regarding eosinophilia in asthmatic patients. In a study conducted by Kumar et al 44 (58%) patients had increased peripheral eosinophil count. They also observed sputum eosinophilia in 19.7% of their asthma patients with severe disease. There was a significant inverse correlation between sputum eosinophil count and predicted FEV1 and forced vital capacity but no significant correlation between peripheral eosinophil count and lung function test ($r = -0.95$). In their study 26.3% patients had a history of allergic rhinitis. Their study involved 76 stable asthmatic patients of 18–60 years of age. Patients with acute exacerbation, clinical

features and spirometry suggestive of chronic obstructive pulmonary disease, those who did not give consent, those who were not able to perform spirometry correctly, patients with history of recent myocardial infarction, and patients on chronic corticosteroid therapy were excluded from their study.¹¹

A pilot study performed on 80 children and adults admitted with asthma exacerbation by Hasegawa et al observed that 40% (95% CI, 26%–56%) of patients had eosinophilia. The median patient age was 32 years (IQR, 24–44 years) in their study while it was 41 years ± 11.02 in our study. Although statistical power was limited, no statistically significant difference was noted in their patient characteristics between patients with eosinophilia and those without (all $P > 0.05$).¹²

Our study had several limitations. We didn't include patients of age lesser than 20 years and greater than 70 years. It was a single centre study and population of study was of a small size. We recommend that a multi center study be conducted on a large scale including all age patients. This will help in exploring the problem in a better way which in turn will guide the physicians and other

Table 2. Stratification of eosinophilia with gender

Eosinophilla	Male	Female	Total	P-Value
Yes	48	23	71	0.8851
No	31	14	45	
Total	79	37	116	

relevant health care workers in better understanding and management of affected individuals.

Conclusion

Eosinophilia is found in a major proportion of bronchial asthma patients. There is a dire need to work on various aspects of this relationship and to attempt to interfere with the steps of eosinophil activation in these patients to help in reducing asthma morbidity and mortality.

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