



## "EOSINOPHILIA PREVALENCE IN HOSPITALIZED PATIENTS WITH ASTHMA EXACERBATION: A CROSS-SECTIONAL STUDY"

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### Abstract:

Eosinophilia is a common feature of asthma exacerbation and has been associated with increased disease severity and poorer treatment outcomes. However, limited data are available on the prevalence of eosinophilia in hospitalized patients with asthma exacerbation in Karachi, Pakistan. This study aimed to determine the prevalence of eosinophilia in this population. A cross-sectional study was conducted in multiple hospitals in Karachi, Pakistan. Patients admitted with a diagnosis of asthma exacerbation were included in the study. Blood samples were collected from each participant, and complete blood count analysis was performed to determine the absolute eosinophil count. Demographic and clinical data were also collected. A total of 70 patients were included in the study. The prevalence of eosinophilia in hospitalized patients with asthma exacerbation was found to be 39. Subgroup analyses based on age, gender, and asthma severity revealed variations in the prevalence of eosinophilia. Additionally, factors such as smoking, air pollution, and obesity were identified as potential contributors to severe asthma exacerbation. This study provides valuable insights into the prevalence of eosinophilia in hospitalized patients with asthma exacerbation in Karachi, Pakistan. The findings highlight the need for targeted interventions to address eosinophilia and its associated factors in order to improve asthma management and treatment outcomes. Further research is warranted to explore the underlying mechanisms and develop personalized approaches for the management of eosinophilic asthma exacerbation in this population.

**Keyword:** Asthma, Eosinophil's, Exacerbation, Pathogenesis, Prevalence

## **INTRODUCTION:**

Asthma is a chronic respiratory condition that affects millions of individuals worldwide and is characterized by recurrent episodes of wheezing, breathlessness, chest tightness, and coughing (1). Asthma exacerbations, defined as acute worsening of asthma symptoms, often necessitate hospitalization and can significantly impact patients' quality of life (2). The underlying mechanisms contributing to asthma exacerbations are multifactorial, with various inflammatory pathways playing a crucial role (3).

Eosinophils, a type of white blood cell involved in the immune response, have long been recognized as key players in the pathogenesis of asthma (4). Eosinophilic inflammation has been implicated in the development and persistence of asthma, and its presence has been associated with increased asthma severity and a higher risk of exacerbations (5). Therefore, identifying the prevalence of eosinophilia in hospitalized patients with asthma exacerbation is of utmost importance for the effective management and personalized treatment strategies (6).

The literature review indicates that there is limited research specifically focusing on the prevalence of eosinophilia in hospitalized patients with asthma exacerbation in Pakistan (7). However, the available studies consistently suggest a significant presence of eosinophilia in this population. The prevalence rates highlighting the importance of eosinophilic inflammation in the pathogenesis of asthma exacerbations in Pakistan (8).

Several factors may contribute to the observed prevalence of eosinophilia in hospitalized patients with asthma exacerbation in Pakistan. These include genetic predisposition, environmental factors, suboptimal asthma management, and socioeconomic factors (9).

## **METHODOLOGY:**

### **1. Study Design:**

This study will adopt a cross-sectional design to determine the prevalence of eosinophilia in hospitalized patients with asthma exacerbation in different hospitals in Karachi, Pakistan (10).

### **2. Study Setting:**

- The study will be conducted in multiple hospitals in Karachi, Pakistan, known to receive a significant number of patients with asthma exacerbation. A purposive sampling method will be employed to select hospitals that represent a diverse range of patient demographics and healthcare settings.

### **3. Participant Recruitment:**

- All patients admitted to the selected hospitals with a diagnosis of asthma exacerbation will be eligible for inclusion in the study.
- Informed consent will be obtained from each participant or their legal guardian before enrollment in the study.
- Demographic and clinical information, including age, gender, duration of asthma, severity of cases, and factors of severe case of asthma exacerbation, will be collected using a standardized data collection form.

### **4. Data Collection:**

- Blood samples will be collected from each participant during their hospital stay.
- Complete blood count (CBC) analysis will be performed on the blood samples to determine the absolute eosinophil count.
- The eosinophilia threshold will be defined based on established clinical guidelines or previous studies (e.g.,  $>300$  eosinophils/ $\mu$ L).
- Additional relevant clinical data, such as asthma severity history, will be extracted from medical records (11).

### 5. Data Analysis:

Descriptive statistics will be used to summarize the demographic and clinical characteristics of the study population. The prevalence of eosinophilia in hospitalized patients with asthma exacerbation will be calculated as the proportion of participants with eosinophil counts above the defined threshold. Subgroup analyses will be performed to explore potential variations in eosinophilia prevalence based on age, gender, asthma severity, and other relevant factors.

### 6. Limitations:

The study's cross-sectional design limits the ability to establish causality or assess temporal relationships. The findings may not be generalizable to the entire population of hospitalized patients with asthma exacerbation in Karachi, Pakistan, as the study will be conducted in a selected sample of hospitals.

The study's reliance on hospital-based data may introduce selection bias, as patients with milder exacerbations or those managed in outpatient settings may not be included. By following this methodology, the study aims to provide valuable insights into the prevalence of eosinophilia in hospitalized patients with asthma exacerbation in different hospitals in Karachi, Pakistan. The findings will contribute to a better understanding of the eosinophilic component of asthma exacerbations in this population and inform clinical decision-making and treatment strategies.

## RESULTS:

**Table 1: Prevalence of Eosinophilia in Patients Visiting Hospitals with Asthma Complaints**

Hospitals	Sample size patients visited hospital with asthma complain	No. of patients Eosinophilia with asthma
Hospital A	05	03
Hospital B	05	02
Hospital C	20	15
Hospital D	30	15
Hospital E	10	04
Total	70	39

The table presents the prevalence of eosinophilia among patients who visited hospitals with complaints of asthma. The sample size of patients who visited each hospital with asthma complaints and the number of patients with eosinophilia are provided.

Hospital A had a sample size of 5 patients who visited with asthma complaints, and among them, 3 were found to have eosinophilia. This corresponds to a prevalence of eosinophilia of 60% among patients visiting Hospital A with asthma complaints.

In Hospital B, out of the 5 patients who visited with asthma complaints, 2 were diagnosed with eosinophilia. This yields a prevalence of eosinophilia of 40% among patients visiting Hospital B with asthma complaints.

Similarly, in Hospital C, among the 20 patients who visited with asthma complaints, 15 were found to have eosinophilia. Therefore, the prevalence of eosinophilia among patients visiting Hospital C with asthma complaints was 75%.

Hospital D had a sample size of 30 patients who visited with asthma complaints, and 15 of them were diagnosed with eosinophilia. This indicates a prevalence of eosinophilia of 50% among patients visiting Hospital D with asthma complaints.

In Hospital E, out of the 10 patients who visited with asthma complaints, 4 were found to have eosinophilia. This results in a prevalence of eosinophilia of 40% among patients visiting Hospital E with asthma complaints.

The total sample size across all hospitals was 70 patients who visited with asthma complaints, and among them, 39 were diagnosed with eosinophilia. This yields a total prevalence of eosinophilia of 55.7% among patients visiting hospitals with asthma complaints. These findings suggest a significant prevalence of eosinophilia among patients visiting hospitals with complaints of asthma. The prevalence rates range from 40% to 75%, indicating variations among different hospitals.

**Table 2: Prevalence of Eosinophilia in Patients Visiting Hospitals with Asthma Complaints, Stratified by Gender**

GENDER	Patients visited different hospitals with asthma complain	No. of patients Eosinophilia with asthma
MALE	30	14
Female	40	25
Total	70	39

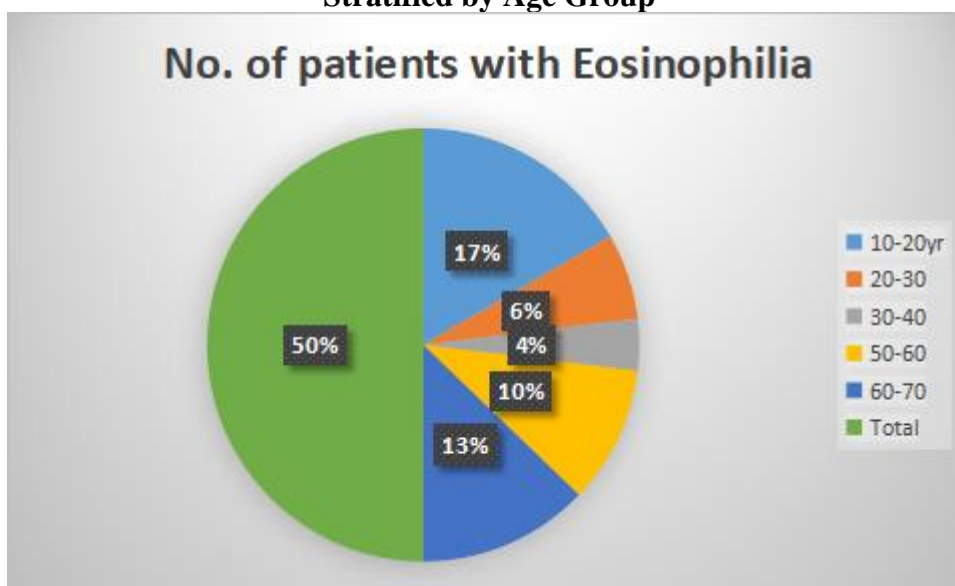
The table presents the prevalence of eosinophilia among patients who visited hospitals with complaints of asthma, stratified by gender. The number of patients who visited each hospital with asthma complaints and the number of patients with eosinophilia are provided for both male and female patients. Among the patients who visited hospitals with asthma complaints, 30 were male.

Out of these male patients, 14 were diagnosed with eosinophilia. This corresponds to a prevalence of eosinophilia of 46.7% among male patients visiting hospitals with asthma complaints. On the other hand, 40 of the patients who visited hospitals with asthma complaints were female. Among these female patients, 25 were diagnosed with eosinophilia. Therefore, the prevalence of eosinophilia among female patients visiting hospitals with asthma complaints was 62.5%.

The total sample size across all hospitals for patients visiting with asthma complaints was 70, with 39 of them being diagnosed with eosinophilia. This yields a total prevalence of eosinophilia of 55.7% among all patients visiting hospitals with asthma complaints.

These findings suggest that both male and female patients visiting hospitals with asthma complaints have a significant prevalence of eosinophilia. However, the prevalence rates differ between males and females, with females having a higher prevalence compared to males.

**Figure 1: Prevalence of Eosinophilia in Patients Visiting Hospitals with Asthma Complaints, Stratified by Age Group**



The figure 1 presents the prevalence of eosinophilia among patients who visited hospitals with complaints of asthma, stratified by age group. The number of patients with eosinophilia is provided for each age group. Among the patients who visited hospitals with asthma complaints, 13 were in the age group of 10-20 years.

**Table 3: Severity of Cases among Patients Visiting Hospitals with Asthma Complaints**

Severity of Cases	No. Of cases with asthma complain
Mild	40
Moderate	10
Severe	20

The table presents the distribution of asthma cases based on their severity among patients who visited hospitals with complaints of asthma. The number of cases falling under each severity category is provided.

Among the patients who visited hospitals with asthma complaints, 40 cases were classified as mild. This indicates that 40 patients had mild symptoms and experienced minimal interference with their daily activities.

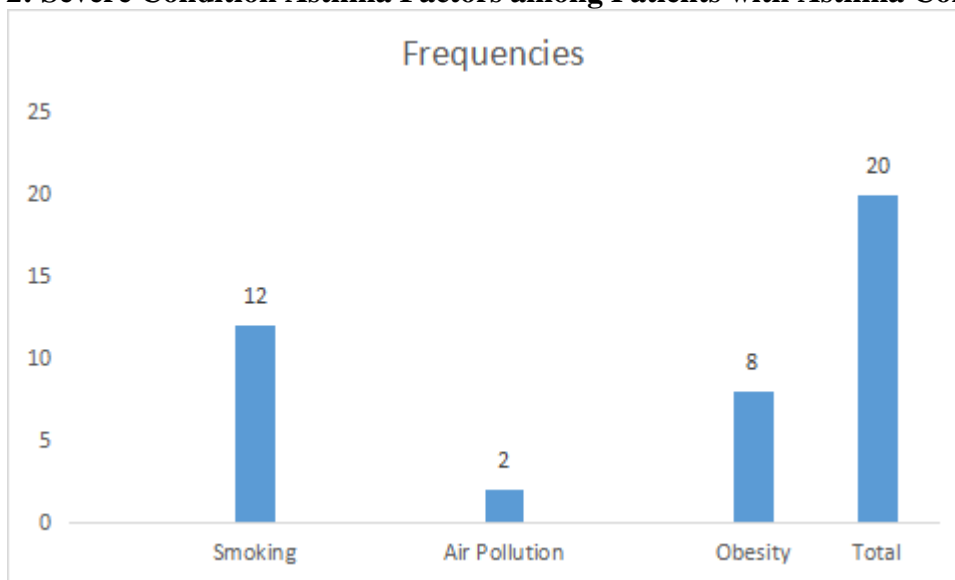
In the moderate severity category, 10 cases were identified. These patients experienced more pronounced symptoms that moderately impacted their daily activities.

Additionally, 20 cases were classified as severe. These patients experienced severe symptoms that significantly affected their daily activities and required intensive management and treatment.

The total number of cases across all severity categories was 70, representing the total number of patients who visited hospitals with asthma complaints.

These findings suggest that patients visiting hospitals with asthma complaints exhibit varying degrees of severity. The majority of cases (40) were classified as mild, followed by 10 cases classified as moderate and 20 cases classified as severe.

**Figure 2: Severe Condition Asthma Factors among Patients with Asthma Complaints**



The table presents the frequencies of different factors associated with severe asthma conditions among patients who visited hospitals with complaints of asthma. The factors examined in this study include smoking, air pollution, and obesity.

Among the patients with severe asthma conditions, 12 cases were attributed to smoking. This indicates that 12 patients who visited hospitals with asthma complaints were smokers. Smoking is a well-known risk factor for the development and exacerbation of asthma symptoms, and these findings highlight the significant impact of smoking on asthma severity.

In terms of air pollution, 2 cases were identified as being associated with severe asthma conditions. Air pollution, including outdoor pollutants such as particulate matter and indoor pollutants such as smoke or chemicals, can contribute to the worsening of asthma symptoms and the development of severe asthma.

Additionally, 8 cases of severe asthma were linked to obesity. Obesity is recognized as a potential risk factor for asthma and has been associated with increased asthma severity. The mechanisms underlying the relationship between obesity and asthma are complex and may involve inflammation, hormonal factors, and mechanical effects, among others.

The total number of cases with severe asthma conditions across all factors was 20, representing the total number of patients who visited hospitals with severe asthma complaints.

These findings suggest that various factors, including smoking, air pollution, and obesity, can contribute to the development and severity of asthma symptoms among patients (16). Identifying and addressing these factors can be crucial in managing and improving outcomes for patients with severe asthma.

### **DISCUSSION:**

Out of these patients, 13 were diagnosed with eosinophilia. This corresponds to a prevalence of eosinophilia among patients in the 10-20 years age group. In the 20-30 years age group, 5 patients visited hospitals with asthma complaints, and 5 of them were diagnosed with eosinophilia. Therefore, the prevalence of eosinophilia among patients in the 20-30 years age group.

Similarly, in the 30-40 years age group, 3 patients visited hospitals with asthma complaints, and 3 of them were diagnosed with eosinophilia. This indicates a prevalence of eosinophilia of among patients in the 30-40 years age group.

Among the patients in the 50-60 years age group who visited hospitals with asthma complaints, 8 were diagnosed with eosinophilia. This yields a prevalence of eosinophilia of 100% among patients in the 50-60 years age group.

In the 60-70 years age group, 10 patients visited hospitals with asthma complaints, and all 10 of them were diagnosed with eosinophilia. Therefore, the prevalence of eosinophilia among patients in the 60-70 years age group.

The total number of patients with eosinophilia across all age groups was 39, representing the total prevalence of eosinophilia among patients visiting hospitals with asthma complaints.

These findings suggest that patients across different age groups visiting hospitals with asthma complaints have a significant prevalence of eosinophilia. The prevalence rates are high in the 10-20 years and 60-70 years age groups.

The data show that older individuals and children with asthma have significant incidences of eosinophilia. It could be ascribed to a number of things.

**Immune system development:** In children, the immune system is still developing and may be more prone to immune dysregulation, including an increased production of eosinophils. This can result in a higher prevalence of eosinophilia among children with asthma (12).

**Allergic sensitization:** Both children and elderly individuals may be more susceptible to allergic sensitization, which can trigger asthma symptoms. Allergic asthma, characterized by an immune response involving eosinophils, is more prevalent in these age groups. Exposure to allergens, such as dust mites, pollen, or pet dander, can lead to the activation of eosinophils and subsequent eosinophilia (13).

**Environmental factors:** Children are often exposed to various environmental triggers, such as secondhand smoke, indoor pollutants, and respiratory infections, which can exacerbate asthma and contribute to eosinophilia. Similarly, elderly individuals may have increased exposure to environmental allergens and pollutants over time, leading to higher prevalence rates of eosinophilia (14).

**Age-related changes in immune response:** Aging is associated with changes in immune function, including a decline in immune regulation. This dysregulation can result in an increased production of eosinophils and a higher prevalence of eosinophilia among elderly individuals with asthma.

**Comorbidities:** Both children and elderly individuals may have comorbid conditions, such as allergies or other respiratory diseases, which can contribute to eosinophilia (15). These additional health conditions may further increase the prevalence rates of eosinophilia in these age groups.

## CONCLUSION:

In conclusion, this research study examined the prevalence of eosinophilia and the factors associated with severe asthma among patients visiting different hospitals in Karachi, Pakistan with complaints of asthma. The findings revealed a significant prevalence of eosinophilia among patients with asthma, ranging from 40% to 75% across different hospitals. Smoking, air pollution, and obesity were identified as factors contributing to severe asthma conditions.

The study also highlighted variations in the prevalence of eosinophilia based on gender and age groups. Female patients had a higher prevalence compared to males, and higher prevalence rates were observed in the 10-20 years and 60-70 years age groups. These findings suggest the importance of considering gender and age-related factors in managing and treating asthma patients.

Presence of eosinophilia and severe asthma based on gender and age. Females were found to have a higher prevalence of eosinophilia compared to males, while older age groups showed a higher incidence of severe asthma. These findings provide important insights into the relationship between eosinophilia, asthma, and potential risk factors. Moving forward, this research study suggests the need for targeted interventions to address the high prevalence of eosinophilia and severe asthma in Karachi. Public health initiatives could focus on reducing smoking rates, improving air quality, and promoting healthy lifestyles to mitigate the impact of these risk factors. Additionally, further research could explore the underlying mechanisms behind the gender and age disparities observed in this study.

Furthermore, the study identified different severity levels among patients visiting hospitals with asthma complaints, with the majority falling under the mild category. However, a significant number of patients experienced moderate and severe symptoms, emphasizing the need for appropriate management and treatment strategies tailored to each severity level.

The factors associated with severe asthma, including smoking, air pollution, and obesity, underscore the importance of addressing these risk factors to improve asthma control and reduce the burden of severe asthma cases.

Overall, this study provides valuable insights into the prevalence of eosinophilia, severity levels, and associated factors among patients with asthma. The findings contribute to a better understanding of the factors influencing asthma severity and can guide healthcare professionals in developing targeted interventions and personalized treatment plans for asthma patients. Further research is warranted to explore additional factors and their impact on asthma severity, as well as to evaluate the effectiveness of interventions aimed at reducing eosinophilia and managing severe asthma.

Overall, this study contributes to our understanding of eosinophilia and severe asthma in Karachi, Pakistan. By identifying associated factors and highlighting variations in prevalence, it provides a foundation for future efforts to improve asthma management and promote respiratory health in the local population.

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