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ORIGINAL RESEARCH

Analysis of white blood cell, percentage of peripheral eosinophils, and absolute eosinophil count in comparison of asthmatic and non-asthmatic patients

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ABSTRACT

Background: A number of cells and cellular components are associated in the chronic inflammatory disorder of the airways known as asthma. In this study, we compared the percentage of peripheral eosinophils in individuals with clinically diagnosed asthma to non-asthmatic adults under the age of 70 and analyzed the various risk factors that contribute to asthma.

Method: This was a case-control research including 50 patients (asthmatic – 25, non-asthmatic – 25). The study was conducted under inclusion and exclusion criteria, and the data was entered into a Microsoft Excel sheet from 2010 and transferred to SPSS for Windows, version 24.0 of IBM's statistical tool for social sciences. The means of the two groups were compared using the T-test.

Results: Eosinophil means and standard deviations were 5.50±2.64 in asthmatic patients and 2.03 ± 1.59 in non-asthmatic individuals. Eosinophil percentage in asthmatics and non-asthmatics differed statistically.

Conclusion: Since no patients in this trial had severe, chronic asthma, it was not included in the analysis. Both asthmatic and non-asthmatic adults had routine tests like complete blood counts, haemoglobin, white blood cells, eosinophil percentages, and absolute eosinophil counts. Adult asthmatic patients had considerably higher absolute eosinophil counts and eosinophil percentages than non-asthmatic individuals. Asthma early signs include blood eosinophil percentage and absolute eosinophil count.

Keywords: Peripheral Asthmatic, Non- Asthmatic, Eosinophils, Absolute Eosinophil Count.

INTRODUCTION

Mast cells, eosinophils, T lymphocytes, macrophages, neutrophils, and epithelial cells are just a few of the numerous cells and biological components that contribute to the chronic inflammatory condition of the airways known as asthma. In those who are sensitive, this inflammation frequently results in episodes of wheezing, shortness of breath, chest tightness, and coughing, especially at night or in the morning. These episodes are frequently accompanied by widespread but variable airflow obstruction, which is frequently reversible either naturally or with treatment. Additionally, the inflammation increases the bronchial hyperresponsiveness that already exists to a range of stimuli. Eosinophilia treatment is mostly guided by clinical history. The doctor is frequently made aware of the potential underlying cause of unusually increased eosinophils by a small number of case-specific factors.However, sometimes more thorough research is required to more precisely establish the reason for their

presence and any potential significance for illness presentation [1]. cells and are regularly counted as part of the total number of blood cells.

The term "eosinophilia" is used when the eosinophil absolute count is greater than 450–500 cells/l. Non-asthmatic eosinophilic bronchitis is a chronic condition that was just recently identified in a small number of patients by Gibson et al. It is known as eosinophilic inflammation of the respiratory tract without bronchospasm and is frequently accompanied by eosinophilia in sputum. It is one of the main causes of a persistent cough [2,3]. An increased eosinophilic response from chronic sinusitis, especially the polypoid kind found in aspirin-exacerbated respiratory disease, might be modest to moderate. These individuals frequently begin with asthma and nasal allergies before developing aberrant arachidonic acid metabolising cascades, which results in a more dramatic presentation of both their disease entity and the eosinophilia[4,5].

A cough that lasts longer than 8 weeks and a normal chest X-ray are both considered chronic coughs in clinical practise. Everywhere in the world, especially at facilities providing outpatient care, chronic cough is a frequent symptom that accounts for 40% of applications. However, in 75–90% of cases, the underlying cause(s) of this illness can be identified. Although it should be included in the differential diagnosis of a chronic cough, non-asthmatic eosinophilic bronchitis is frequently disregarded.Since bronchial inflammation may only seldom be thoroughly examined, it is probably underdiagnosed[6].

In order to compare the WBC, percentage of peripheral eosinophils, and absolute eosinophil count between adults with asthma and those without asthma, the current research was conducted.

MATERIALS AND METHODS

The case study was conducted among 50 patients (asthmatic – 25 and non-asthmatic-25), under the age group of 70 years, under the following criteria:

CRITERIA FOR EXCLUSION

1. Wheeze with heart illness
2. Wheezing due to lung congenital defects or diseases of the respiratory system
3. A single wheeze

CRITERIA FOR INCLUSION

1. A history of bronchial asthma in the family
2. A history of allergic rhinitis in the family
3. Previous atopic eczema history
4. Similar problems have been treated quickly with inhaled short-acting beta agonists, in past.
5. An episode of wheezing brought on by dust, cool goods consumed, seasonal changes, exercise, etc.

Adults with a clinical diagnosis of asthma between the ages of 18 and 26 were chosen. At the outpatient department, these adults were just recently diagnosed with asthma (OPD). Controls of the same age who have never had asthma, allergies, or respiratory symptoms were chosen. A pre-tested questionnaire that comprised numerous criteria like age, sex, an identifying number, and a thorough history of the symptoms was used to collect data for the study.

According to the global initiative for asthma (GINA) guidelines, additional information about the cases group was obtained, including the number of exacerbations, hospital admissions, TB contacts, etc. Cases were then divided into intermittent, mild persistent, moderate persistent, and severe persistent bronchial asthma [4].

In order to rule out further wheezing reasons, a thorough clinical examination was conducted. Acid fast Bacilli (AFB) were detected by tests such the CBC, eosinophil percentage, Mantoux test, spirometry, chest X-ray, and sputum or stomach aspirate. Spirometry was carried out while the subjects were sitting. Both the forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) parameters were measured. The two greatest values of FEV1 and FVC were replicated within 4% for a minimum of the three permitted manoeuvres. For analysis, the highest FVC and FEV1 values were selected.

STATISTICAL ANALYSIS

The data was entered into a Microsoft Excel Worksheet from 2010 and then transferred to IBM SPSS statistic for Windows, version 24, where the frequency, percentage, mean, and standard deviation were calculated. The means of two groups were compared using the T-test.

RESULTS

Table 1 shows that there were 50 patients, with a male to female ratio of 3:1 and a gender breakdown of 77% men and 23% women.

Table 1: Characterization of the studied populations from a biosocial perspective

Sl. No.	Characterization	Number	Percentage
Gender			
1.	Female	13	23%
2.	Male	37	77%
	Total	50	100%
Allergy Severity			
1.	Minimal severity	13	15%
2.	Moderate severity	05	10%
3.	Intermittent	32	35%
	Total	50	100%
Allergy Conditions			
1	No	25	50%
2	Yes	25	50%
	Total	50	100%
Built of the Patient			
1	Mild	2	2%
2	Moderate	48	98%
	Total	50	100
History of bronchial asthma in Patient			
1	No	27	68%
2	Yes	23	32%
	Total	50	100%

The mean ages of the male and female participants in the current study were 6.66 and 6.74, respectively. Males' age standard deviation was 2.62, while females' was 2.69. Out of 50 patients, 50% were reported to have allergies, whereas the other 50% did not. Of 50 patients, bronchial asthma was present. Among them, 68% of the patients had no history of bronchial asthma in their families. Only two members of the non-bronchial asthma group had a family history of the condition, while the remaining 48 participants had none.

According to studies on allergy severity, of the 50 patients, 32 patients—or 35% of the population overall—had intermittent severity, 13 patients—or 15% of the population overall—had mild persistent severity, and 5 patients—or 10% of the population overall—had

moderate persistent severity. Out of 50 patients, 32% were reported to have FHBA whereas the remaining 68% were reported to not have the condition. 98 percent of the 50 patients were moderately built, while 2% were mildly built.

Table 2 compares patients with and without asthma in terms of their peripheral and absolute eosinophil counts.

Table 2: Patients with and without asthma are compared in terms of peripheral and absolute eosinophil counts.

Comparison of Actual Eosinophil Count InAllergy Severity vs Control Group		
Patient Type	**Actual Eosinophil Count Mean ± SD**	**p-Value**
Minimal persistent	570.49 ± 383.91	P= 0.002
Moderate Persistent	1046 .49 ± 835.14	
Intermittent	457.08 ± 253.97	
Non-Asthmatic	180 ±1.07	
Comparison of Eosinophil Count In Allergy Severity vs Control Group		
Patient Type	Eosinophil % Mean ± SD	P= 0.002
Minimal persistent	6.3 ± 5.15	
Moderate Persistent	10.3 ± 6.83	
Intermittent	4.62 ± 2.53	
Non-Asthmatic	2.03 ± 1.57	
Comparison of EosinophilCountwithMinimalPersistentVsModerate PersistentPatients		
Patient Type	**Eosinophil%Mean±SD**	P=0.02
Minimalpersistent	6.2±5.15	
Moderate Persistent	10.3±6.83	
Comparison of EosinophilCountwithIntermittentVsModeratePersistentPatients		
TypeofPatients	**Eosinophil%Mean±SD**	P = 0.02
Intermittent	4.62±2.53	
Moderatepersistent	10.3±6.83	
Comparison of ActualEosinophilCountwithMildPersistentVsModeratePersistentPatients		
TypeofPatients	**Actual EosinophilCountMean±SD**	P = 0.02
Mildpersistent	571.50±384.92	
Moderatepersistent	1047.50±836.15	
Comparison of ActualEosinophilCountinIntermittentVsModeratePersistentPatients		
TypeofPatients	**Actual EosinophilCountMean±SD**	P = 0.003
Intermittent	458.09±254.98	
Moderatepersistent	1047.50 ±836.15	
Comparison of ActualEosinophilCount betweenIntermittentVsMildPersistentPatients		
TypeofPatients	**Actual EosinophilCountMean±SD**	P = 0.03
Intermittent	458.09±254.98	
Mildpersistent	571.50±384.92	
Comparison of EosinophilCountinIntermittentVsMildPersistentPatients		
SeverityofAsthma	**Eosinophil%Mean±SD**	P=0.02
Intermittent	4.63±2.54	
Mildpersistent	6.3±5.16	

Table 2 shows that the percentage of eosinophils in asthmatic patients was compared between intermittent patients and moderate persistent patients. According to statistics (P=0.002), there is a difference between the eosinophil percentage of intermittent and moderately persistent patients. Eosinophil percentages were studied between mildly and moderately chronic asthma patients. Statistically (P=0.2), there is no difference between patients who are mildly persistent and those who are moderately persistent. Actual eosinophil counts in asthmatic

patients were compared between intermittent and moderate persistent patients. According to statistics (P=0.3), there is no difference in the real eosinophil count between patients who are intermittent and those who are mildly persistent. Actual eosinophil counts in asthmatic patients were compared between intermittent and moderately persistent patients.Between mild persistent patients and moderate persistent patients, the real eosinophil count was compared in asthmatic patients. Statistically (P=0.2), there is no difference between patients who are mildly persistent and those who are moderately persistent.

Patients with asthma had haemoglobin means ± SD of 11.35 ± 1.55, while those without asthma had values of 11.68 ± 1.5. P=0.45 demonstrates that there is no difference between people with and without asthma. Therefore, research suggested that asthma patients' haemoglobin levels might not be impacted. Patients without asthma had a WBC mean SD of 8731 and those with asthma had a mean SD of 11031 and 4968.7. It demonstrates that people with and without asthma differ; P=0.0002.In other words, research showed that asthma sufferers' WBC was higher than that of non-asthmatics. Eosinophil mean SD in asthmatic patients was 5.50 ±2.62, while it was 2.03±1.57 in non-asthmatic patients. It demonstrates that there is a difference in eosinophil percentage between patients with asthma and those without asthma; P = 0.0002. Therefore, it suggested that asthma patients had a high eosinophil proportion. Patients with asthma had an AEC mean SD of 521.75±232.16, while those without the condition had an AEC mean SD of 180.07±82.73. It demonstrates that there is a difference in AEC between patients with and without asthma; P = 0.0002. Patients with asthma had elevated AEC.

DISCUSSION

Although persistent airflow restriction and eosinophilic airway inflammation are hallmarks of asthma, it is unclear how these two conditions are related [6]. Although remodelling of the airway wall is linked to tissue eosinophils, it is unknown if this is a causal relationship [7,8]. Exacerbations are decreased by reducing eosinophilic inflammation with inhaled corticosteroids,[9,10]. but it hasn't yet been demonstrated that it can stop the growth of fixed airflow obstruction. The measurement of eosinophilic airway inflammation using generated sputum is inappropriate for ordinary clinical practise or extensive epidemiological investigations, which is one cause of the uncertainty (11). A promising and simple to detect marker of eosinophilic airway inflammation has been identified as peripheral blood eosinophil counts [12,13]. Poor asthma control and an increased risk of exacerbations are linked to high blood eosinophil levels [14,15]. The response to inhaled corticosteroids in patients with chronic obstructive pulmonary disease (COPD) and the response to anti-interleukin-5 therapy in patients with asthma are also predicted by blood eosinophil levels [16,17,18]. Although not all studies have shown this, blood eosinophil levels have been linked to reduced forced expiratory volumes in 1 second (FEV1) in persons with and without asthma [12,14].However, a larger drop in FEV1 was seen in COPD patients with high blood eosinophil counts who were not receiving inhaled corticosteroids [10]. Blood eosinophils did not indicate an accelerated decline in FEV1 in people with asthma [12]. In a cohort of young adults born into the population, we looked into the relationships between blood eosinophil counts and lung function. In patients with asthma, we predicted that eosinophilic inflammation would lead to airflow obstruction and a reduction in lung function.In the current study, 50 patients were involved, of which 50 had allergies and the remaining 50 did not. 50 participants in all were enrolled in the trial, of which 50 (50%) had asthma and 50 (50%) did not (control group). In 50 populations, the male to female ratio was 2:1, with 77% of the population being male and 23% female. It appears that men are more likely than women to get asthma. Amir et al.'s[19] study showed a male to female ratio of 1.6:1, and Animesh Jain et al.'s[20] study discovered a male to female ratio of 1.5:1 for prevalence.

Patients with asthma had an Eosinophil mean SD of 5.50 2.64, while those without asthma had a mean SD of 2.03 1.59. According to statistics, there is a difference between patients with asthma and those without asthma in terms of eosinophil percentage (P = 0.0002). As a result, asthma sufferers have a high eosinophil proportion. According to a study by Bhalla K et al. [22], 6.9% of asthma patients had high eosinophil counts, and it was found that atopy and eosinophil levels interacted strongly in children but not in the oldest adults. This suggests different mechanistic pathways for these factors depending on age and supports the idea that asthma is a heterogeneous disease.

CONCLUSION

25 asthmatic sufferers and 25 non-asthmatic controls were included in the study. According to GINA recommendations, asthmatics were divided into four categories: intermittent, mildly persistent, moderately persistent, and severely persistent. Asthma was not included in the study since none of the participants in our study sample had severe, persistent asthma. Patients with and without asthma underwent routine examinations and had their CBP, Hb%, WBC, eosinophil percentage, and absolute eosinophil levels evaluated. Asthmatic patients had considerably higher absolute eosinophil counts and eosinophil percentages than non-asthmatic individuals. Conclusion: Absolute eosinophil count and blood eosinophil percentage can be used as early warning signs of asthma.

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