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The diagnostic utility of Serum IgE and Absolute eosinophil count in cases of Allergic Rhinitis

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Introduction: Allergic rhinitis is the commonest allergic disease in India. Eosinophils have been long associated with allergies. Serum IgE levels are also used as a parameter to support the diagnosis of the same. Both absolute eosinophil count (AEC) and serum IgE are a part of basic investigation panel for allergies and are known to be positively related with it. Thus, this study was taken up to determine the diagnostic utility of Serum IgE and absolute eosinophil count in cases of Allergic rhinitis. **Methodology:** This was a two-year prospective study conducted on 105 cases, clinically diagnosed as allergic rhinitis. Absolute eosinophil count and total serum IgE were recorded for all the cases. Diagnostic utility of each parameter was determined using appropriate statistical tests. Results were tabulated and assessed. **Results:** Among 105cases, 44.8% were females and 55.2% were males, with mean age of 29.8years. Peripheral blood eosinophils >6% were seen in 42% cases. Of the total cases, Absolute eosinophil count was increased>450cells/cu mm in 49 (46.6%) cases and Serum IgE was elevated >120IU/ml in 73(69.5%) cases. Both AEC and Serum IgE together were raised only in 39(37.1%) cases. **Conclusion:** Thirty-nine (37.1%) cases showed simultaneous increase in AEC and Serum IgE. The outcomes of both tests when considered together did not significantly affect the diagnosis of Allergic rhinitis. However, individually, 49 (46.6%) cases had a high absolute eosinophil count and Serum IgE was raised in 73(69.5%) cases. Although not significant, testing for Serum IgE levels were found to be more accurate with a better diagnostic utility.

Keywords: Allergic Rhinitis, Absolute Eosinophil Count, Serum IgE

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To Browse

Introduction

Rhinitis is a combination of various nasal symptoms which can range from being mild to severe. When these symptoms are a result of an allergen, it is termed as Allergic Rhinitis. Allergic rhinitis is a global health problem with increasing incidence [1,2,3]. It is an inflammatory disorder of the nasal mucosa induced by allergen exposure which triggers

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IgE-mediated inflammation [3]. It presents with watery nasal discharge, nasal obstruction, sneezing, and itching in nose [3-7]. Allergic rhinitis, although being a common disease with a prevalence of 3.5% in India, impairs the quality of life and leads to significant expenses for its treatment and care [4,5].

Eosinophils have been long associated with allergies [1,6,7,8,9]. Serum IgE levels are also used as a parameter to support the diagnosis of the same. IgE levels are ≤120IU/ml for healthy non-allergic adults [7,10]. The normal absolute eosinophil count is 40-450 cells/mm3 [11]. Both absolute eosinophil count and serum IgE are a part of basic investigation panel for allergies and are known to be positively related with it. They provide evidence for the presence of allergy [6,12]. This study was done to determine the diagnostic utility of Serum IgE and absolute eosinophil count in cases of Allergic rhinitis and to find out the correlation between the two parameters.

Methodology

Type of Study: This was a Prospective Descriptive Observational Study

Duration: It was conducted for a period of two years from June 2016 to June 2018.

Setting: Laboratory Setting

Place of Study: Department of Pathology, Karnataka Institute of Medical Sciences, Hubli, Karnataka.

Sample Size: 105 clinically diagnosed cases of Allergic Rhinitis (all cases).

Inclusion criteria: All cases, new or old, clinically diagnosed as Allergic Rhinitis on or not on treatment were included in the study.

Exclusion criteria: Patients with rhinitis other than Allergic Rhinitis as well as patients with known history of Asthma or any other allergic disease were excluded from the study.

Data collection and interpretation: Peripheral smear examination was done for all patients. Absolute eosinophil count was calculated using counter values as well as manually on Neubauer's Chamber. Average of the two was taken as the absolute eosinophil count. Total serum IgE levels were calculated using Chemiluminescent method for all the cases. Diagnostic utility of each parameter Was determined using appropriate statistical tests. Results were tabulated and analyzed using various statistical tools.

Results

Out of all the 280 cases of rhinitis, 105 (37.5%) cases were clinically diagnosed as Allergic Rhinitis (Figure 1).

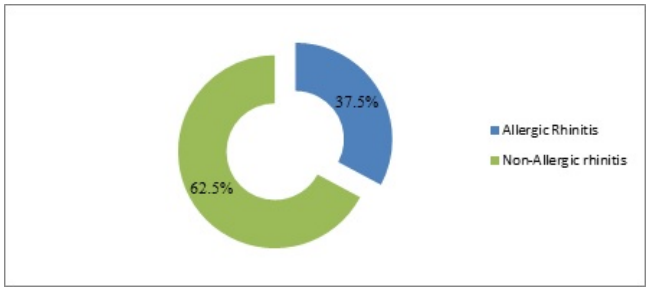

Fig-1: Incidence of Allergic Rhinitis in this study.

Of these 105 cases, 58 (55.2%) were males and 47 (44.8%) were females with Male: Female ratio of 1.2:1. Age range was found to be 11-70 years with a mean of 29.8 years. Majority of cases with increased absolute eosinophil count and serum IgE were found to be less than 40 years of age (Table 1).

Table-1: Distribution of cases with Increased AEC and Serum IgE

Age Range (years)	Cases with Serum IgE >120IU/ml	Cases with increased AEC>450	Total
11-20	18	11	29
21-30	25	13	38
31-40	17	13	30
41-50	8	8	16
51-60	4	4	8
61-70	1	0	1

Of the total allergic rhinitis cases, 44 (42%) cases showed peripheral blood eosinophils >6%. Absolute eosinophil count was increased >450cells/cumm in 49(46.6%) cases. Absolute eosinophil count ranged from 300-2000 cells/cu mm with mean Absolute eosinophil count of 553cells/cu mm. Serum IgE was found to be elevated i.e.>120IU/ml in 73(69.5%) cases. Mean Serum IgE value was found to be 603.7IU/ml.

Only 39 (37.1%) cases showed raise in both Absolute eosinophil count and Serum IgE. There was found to be a positive relation between the two however it was not significant (P-value >0.05).

Twenty cases (19.04%) did not show rise of any of the two parameters (Table 2).

Table-2: Main findings of this study

Findings	Number of cases	Percentage
Only AEC raised	49	46.67
Only Serum IgE raised	73	69.52
oth AEC and Serum IgE raised	39	37.2
AEC and Serum IgE both normal	20	19.04

Discussion

Allergic rhinitis is a seasonal disease which is characterized by sneezing, lacrimation, itching, nasal obstruction and rhinorrhea. It is directly associated with allergen, which in most cases is pollen. Allergic rhinitis mainly has a seasonal presentation, however, in chronic exposure or in cases of allergens present constantly, it may present throughout the year. It occurs predominantly in those individuals who have a family history of atopy or in those who have other forms of allergic diseases like asthma, urticaria, dermatitis, eczema or nasal polyps. Majority of the cases of allergic rhinitis occur in individuals less than 40 years of age. The mechanism of occurrence of allergic rhinitis is based on the principle of Type I hypersensitivity reaction. The nose has a large mucosal surface and when allergen comes in contact with intra-epithelial mast cells, there is production of IgE and sensitization occurs. Also, there is increased recruitment of neutrophils and eosinophils [3,13].

Allergic Rhinitis is a debilitating condition with an incidence of 20-30% and constitutes around 50% allergies in India [2,3,8]. If untreated, it causes many economic and health-associated consequences [4]. In the present study the incidence of allergic rhinitis was found to be higher (Figure1). This could be attributed to the fact that patients in the study consisted mainly of young adults, due to seasonal differences or demography related allergens.

This study was conducted on 105 cases clinically diagnosed as allergic rhinitis. The mean age in this study was similar to the studies done by Tegnoor et al (33.12 years) and Jagadeeshwar et al (33.1 years) [4,6]. Majority (78.1%) of the cases were found to be less than 40 years of age (Table 1). This finding was concordant with studies done by Tegnoor et al (70%) and Shrivastava et al (75%) [4,5]. According to literature, allergic rhinitis is Mainly seen in young adults and childhood [3,13] while the incidence decreases in elderly [11]. Males were more than females as seen in other studies [4,6,7,12].

Nasal secretions of allergic patients are rich in eosinophils. Another common feature is moderate peripheral eosinophilia. Serum IgE is quite frequently elevated. However, the specificity of IgE is crucial for etiological diagnosis [13]. Thus with respect to the current study and according to the literature, Absolute eosinophil count and Serum IgE are both positively related with allergic rhinitis. In general, both are considered to be higher in allergic subjects than in non-affected healthy individuals [5,12,13,14].

Mean Absolute eosinophil count in the present study was found to be 553cells/cu mm which was similar to study done by Shrivastava et al [5]. Other studies however had lower values [7,12].

Mean Serum IgE was found to be 603.7IU/ml in the current study. Highly varied values were seen across various other studies conducted [5-7].

Demirjian et al in their study concluded, that majority of the cases show increased Absolute eosinophil count (80-90%) [12]. In present study however, less number of patients had isolated increase in absolute eosinophil count (table 2) and this was concordant with study done by Shrivastava et al in which only 44.5% cases showed increase in Absolute eosinophil count [5]. A general notion would be that peripheral eosinophilia is a mandatory finding in allergic rhinitis. However more than half the cases in this study had normal values of absolute eosinophil count. A nasal smear will be more diagnostic, but it was not considered for this study.

Post sensitization with allergen, the mast cells in mucosa and basophils and eosinophils in circulation are coated with IgE. Subsequent attacks manifest as Allergic rhinitis. There is a significant rise in IgE. In this study isolated Serum IgE levels were raised in lower number of cases (table 2) as compared to other studies where 90% cases showed rise in Serum IgE [4,6,7]. Reducing IgE levels is the strategy followed for treating Allergic Rhinitis and therefore, this assessment holds a better value and is needed for formulating and implementing a management plan for allergic rhinitis [15].

Only 37.2% cases showed simultaneous increase in both Absolute eosinophil count and Serum IgE

(Table 2). P-value was calculated between the two parameters. The correlation found was not significant. However, Halonen et el established a significant relation between Serum IgE and peripheral eosinophils. Also, they stated that IgE is a better diagnostic as well as a superior prognostic marker [14]. Di Lorenzo et al also obtained a positive relation between Serum IgE and absolute eosinophil count [15]. Both the factors, however, play a role in development of full-fledged allergic response. Such facts compiled together help in formulating a management strategy. Hence, both Serum IgE and absolute eosinophil count must be included in the test panel.

In the present study 19.04% cases neither showed increase in Absolute eosinophil count nor a rise in Serum IgE (Table 2). This picture could be seen in cases with primary allergen response, low level exposure, non-seasonal variation and in those patients, who are on treatment for allergic rhinitis.

Limitations: There is a need to expand this study and overcome some of the limitations so as to obtain even more accurate results which can be considered while managing Allergic rhinitis. Some of the drawbacks were: a) lack of control group, b) lack treatment history and not considering the signs and symptoms and c) a correlation with nasal smear would have given more precise outcomes.

Conclusion

Allergic rhinitis is an IgE-mediated type I hypersensitivity reaction involving the nasal mucosa. It is a disease of young mainly affecting people aged<40 years. There is need to evolve a strategy for economical and precise diagnosis of the same. Absolute eosinophil count and Serum IgE, both are reliable markers of allergic rhinitis. Seventy percent cases in this study showed increase in Serum IgE levels. Serum IgE level is a better marker with superior diagnostic utility.

What the study adds to the existing knowledge?

A generally assumed fact that peripheral eosinophils are always raised in cases of allergic rhinitis does not hold true in this study as less than 50% cases showed increased absolute eosinophil count. No significant correlation was found between absolute eosinophil count and Serum IgE (p-value > 0.05). Therefore, both tests must be conducted in cases of Allergic rhinitis based on which a management protocol can be framed.

Author's contributions

Dr. Akanksha Agrawal: Concept, study design

Dr. Rajesh H Chandan: Data analysis, manuscript preparation

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