

## Assessment of serum IgE levels in patients of allergic rhinitis

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**Abstract:** *Objectives:* To determine the variation of IgE levels with various age & sex groups. To determine the utility of total serum IgE and eosinophil count in the diagnosis of Allergic rhinitis. *Background:* Immunoglobulin E is widely recognized as the major molecular component of atopy and the allergic reaction starts when IgE binds to mast cells. This leads primarily to the release of various mediators (histamine, leukotrienes and prostaglandin) and to the production and release of cytokines from these cells. The action of these mediators on down stream targets leads to the clinical allergic symptoms and the action of the cytokines to allergic inflammation. *Methods:* A total of 60 rhinitis patients who reported at the Allergy clinic from June 2014 to March 2015 were included in this study. The symptomatic criteria for allergic rhinitis include, mainly paroxysmal sneezing, watery rhinorrhoea and lacrimation. After clinical evaluation Pts who had rhinitis were subjected to IgE level study. *Result:* All patients were arranged in six groups according to different age. Female patients were found to form a majority of our study. Patient group that suffered allergic rhinitis are highest with IgE level < 380 IU/ml i.e 62% followed by IgE level 381 - 450 IU/ml who were 12%, and least were 3% who had IgE levels 651 -750 IU/ml. *Conclusion:* The predominant symptoms associated with Allergic Rhinitis are sneezing (90%), rhinorrhea (75%) and nasal congestion (48%). The Mean Age of individuals is 33.12 years. Elevated total IgE can be included as a diagnostic criterion for allergic rhinitis. In general, adults and children with allergic rhinitis have been found to have higher total serum IgE concentrations as compared to non-atopic individuals. The IgE levels are elevated in more than 90% of patients with sneezing as the predominant symptom. The IgE values are higher in patients with symptoms of sneeze plus wheeze as compared to those with sneeze alone. Eosinophil counts are consistently higher in the allergic population and they are not influenced by gender, the presence of asthma, or of smoking. IgE levels greater than 140 IU/ml and eosinophil counts greater than 80 cells/ml are suggestive of an atopic aetiology for patients with signs and symptoms of rhinitis

**Keywords:** Allergic Rhinitis, IgE Levels, Eosinophil Count.

### Introduction

Allergic rhinitis is the commonest allergy encountered in clinical practice and constitutes more than 50% of all allergies seen in India [1]. Infact, 1 in 6 people suffer from rhinitis, which makes it the commonest chronic disease of man today and even now it's incidence is steadily increasing. Nasal symptoms are often demeaned; however, their prevalence and effect on the quality of life, justify an aggressive but rational approach. It must also be acknowledged that rhinitis and asthma frequently co-exist, with rhinitis appearing first in about 45% of patients [2]. Besides, it is now well documented that adequate nasal treatment can improve pulmonary functions.

Allergic rhinitis can be a debilitating condition which, if untreated, can result in considerable health-related and economic consequences. A review of the published literature was conducted, with quantitative/qualitative analysis as appropriate, to explore the direct, indirect, and hidden costs of allergic rhinitis, as well as the quality-of-life burdens that the disease presents to patients and to the health care system.

Lack of treatment, under treatment, or non adherence to treatment in allergic rhinitis were seen to increase direct and indirect costs, reinforcing the need for patient education and for physicians to implement existing evidence-based guidelines for prevention and

treatment. It was concluded that greater awareness of the total economic burden of allergic rhinitis should encourage appropriate intervention and ultimately ensure clinically favorable and cost-effective outcomes.

*Aims and Objectives:*

1. To determine the variation of IgE levels with various age groups
2. To determine the variation of IgE levels with different sex.
3. To study the various levels of IgE in different groups.
4. To determine the utility of total serum IgE in the diagnosis of Allergic rhinitis

**Material and Methods**

A total of 60 rhinitis patients who reported at the Allergy clinic from June 2014 to March 2015 were included in this study. These patients were evaluated in detail on the basis of history, clinical examination and routine investigations done at Shadan Institute of Medical Sciences, Hyderabad. The symptomatic criteria for allergic rhinitis include, mainly paroxysmal sneezing, watery rhinorrhoea and lacrimation.

*Clinical examination:* Routine clinical examination of the ears, nose, throat, and lungs was made in all cases using the standard head mirror, bull's eye lamp and stethoscope. Clinical signs of allergic rhinitis include pale and oedematous nasal mucosa, swollen turbinates and a thin, watery or mucoid discharge. Ocular features are, oedema of eyelids, congestion of conjunctiva and watering of eyes. Rhinitis with asthma is characterized by features of allergic rhinitis and wheeze from lungs on auscultation.

*IgE estimation and eosinophil count:* Total IgE levels were measured using IMX ® Total IgE assay method for the quantitative measurement of serum IgE in the humans. It is a microparticle enzyme immune assay (MEIA). Total IgE levels are represented as IU/ml. Absolute Eosinophil count (AEC) was made from the total leukocyte count and differential count (indirect method) and by the direct method using light microscopy. ABX pentra 120 Retic was also used for the estimation of eosinophil percentage. It is based on the principle of electronic impedance, light scatter and cytochemistry.

**Results**

**Table-1: Age wise Distribution Percentage (n = 60)**

Age	No. of Cases	Percentage
Group 1 (< 20 Years)	18	30.00
Group 2 ( 20 - 30 Years)	12	20.00
Group 3 ( 31 – 40 Years)	12	20.00
Group 4 ( 41 -50 Years)	9	15.00
Group 5 ( 51 -60 Years)	7	11.66
Group 6 (> 60 Years)	2	3.33
<b>Total</b>	<b>60</b>	<b>100.00</b>

**Table-2: Sex wise Distribution Percentage (n = 60)**

Sex	No. of Cases	Percentage
Male	29	48.33
Female	31	51.66
<b>Total</b>	<b>60</b>	<b>100.00</b>

**Table-3: Symptoms Percentage(n = 60)**

Symptoms	No. of Cases	Percentage
Sneezing	54	90
Rhinorrhoea	45	75
Nasal obstruction	29	48
Itching of throat	8	13
Itching of eyes	15	25

**Table-4: Signs Percentage (n = 60)**

Signs	No. of Cases	Percentage
Wheeze	9	15
Deviated nasal system	47	78
Turbinate hypertrophy	28	47
Pale mucosa	57	95

IgE Levels (IU/mL)	No. of Cases	Percentage
Group 1 (< 380)	6	10
Group 2 (381 - 500)	34	57
Group 3 (500 – 750)	9	15
Group 4 (751 -1000)	6	10
Group 5 (1001 -1250)	2	3
Group 6 (>1250)	3	5

Eosinophilic Levels (Cells/mcl)	No. of Cases	Percentage
Group 1 (Normal 40 -440)	51	85
Group 2 (441 – 550)	5	8
Group 3 (551 -650)	2	3
Group 4 (> 650)	2	3

Serum IgE levels after 3 months	No. of Cases	Percentage
Group 1 (0 - 9)	14	23
Group 2 (10 - 39)	34	57
Group 3 (40 - 59)	11	18
Group 4 (60 - 79)	1	2
Group 5 (> 80)	0	0

### Discussion

This study is conducted in the Otolaryngology department of Shadan medical college Hospital to explore the clinical profile and to find out the relationship between the predominant symptoms and laboratory markers (Total IgE, Peripheral eosinophil and Absolute Eosinophil Count) so that patients would be given treatment for proper control of symptoms.

The predominant symptoms associated with Allergic Rhinitis encountered in our study are sneezing 90%, rhinorrhea 75% and nasal congestion 48%. Patients also complained of symptoms like ocular itching, cough and post-nasal

drip. A study reported by Taimur Saleem, Umair Khalid, Rehman Sherwani Clinical profile, outcomes and improvement in symptoms and productivity in rhinitis patients in Karachi, Pakistan. BMC Ear, Nose and Throat Disorders 2009; 9:12. says that the common symptoms that were reported were sneezing, rhinorrhoea and nasal congestion which were present in more than 90% of the patients who visited the allergy clinic but other complaints like post nasal drip, ocular symptoms, itching, cough, and sore throat and even decreased sense of taste were also reported [3].

In our study, Males (53.8%) are found to be slightly more commonly affected than Females (46.1%). This distribution of male and female patients is consistent with the findings of previous studies. The Mean Age of individuals is 33.12 years. This is in concordance with that evaluated patients of allergy; mean age at diagnosis being 32 years [4]. Allergic sensitization mediated by IgE is the basis of allergic diseases and elevated total IgE, in spite of well-known limitations, is a frequently included diagnostic criterion for allergic diseases [4]. Several earlier studies have evaluated the role of IgE in patients with a variety of allergic diseases. In general, total serum IgE levels were considered to be higher in allergic subjects than in healthy subjects. Adults and children with allergic rhinitis and asthma have been found to have higher total serum IgE concentrations as compared to non-atopic individuals. About half of atopic patients have the total IgE concentrations that are two standard deviations above the mean of a normal control group [3-6].

Among all age groups, difference between mean IgE levels between allergic subjects and controls was significant [7]. A study reported in 1981 says that mean total serum IgE levels were 38±43 KU/l- 180KU/l in normal subjects and 94±93 KU/l in allergic subjects and asthmatics have higher mean IgE levels than those who are suffering from rhinitis [8]. In a study conducted in 1980, Normal IgE levels for total sample were 32 IU/ml. Highest IgE levels was found in patients with both asthma and eczema (985 IU/ml) followed by asthma alone (305 IU/ml), eczema alone (273IU/ml)

and then Allergic Rhinitis (171 IU/ml) [9-10]. In our present study, the IgE levels is elevated in more than 90% of patients with sneezing as the predominant symptom. In Cases of persons with symptoms of sneezes plus wheeze, the value is the highest (794.34 IU/ml) followed by persons with symptom of Sneezing. In Individuals with symptoms of nasal obstruction without polyposis (118.48 IU/ml), the IgE levels is similar to the controls (124.34) in more than 90% of patients.

In this data also Eosinophil counts is consistently higher in the atopic population and this trend is not influenced by gender, the presence of asthma, or whether or not the individual smoked. Although the significance of blood eosinophilia is disputed, this trend has been reported by others [11-14]. In normal patients with no skin reactivity and in asymptomatic patients with positive skin reactivity, Felarca and Lowell found mean eosinophil counts of 100 cells/ml and 202 cells/ml respectively [15]. These figures are in agreement with our non-atopic (eosinophils =135 cells/ml) and atopic (eosinophils =219 cells/ml) populations. The thresholds of 140 IU/ml for serum IgE level and 80 cells/ml for eosinophil count are chosen because it is at these points that the largest initial divergence occurs and where the largest difference between the positive and negative weights occurred. The threshold value of 140 IU/ml for atopy is not radically different from what has been previously published. For example, Grater et al. performed 5500 IgE measurements in 7000 referred patients and determined that IgE levels greater than 80 IU/ml should be the minimum level required to confirm atopy [16]. In addition, in two independent studies, Mullarkey and Zetterstrom et al. reported strong evidence for the presence of atopic disease when IgE values were greater than 100 IU/ml [17-18].

Hetman et al. found a preponderance of atopic individuals with IgE levels greater than 120 IU/ml, 36 and Haahetela et al. concluded that IgE values greater than 160 IU/ml suggest atopy [19]. The 80 cells/ml threshold was chosen since the positive weight was greater (0.33 vs. 0.28) and the negative weight less (-1.17 vs. -1.22). This study demonstrates that IgE levels greater than 140 IU/ml and eosinophil counts greater than 80 cells/ml are suggestive of an atopic etiology for patients with signs and symptoms of rhinitis. Our

data is collected from a referred population where the pretest probability of the disease (i.e., prevalence of atopy) is quite high (70%). Since this has a great influence in determining post test probability, it is suggested that IgE and eosinophil counts may have an even greater influence in a population with a lower pretest probability of disease. Furthermore, although this study was conducted in a general population with a considerable age and sex variation, our data are in general agreement with previous reports. However, caution should be used when applying them to the population as a whole since others have reported that both age and sex may influence IgE levels and eosinophil counts. Nevertheless, these data do suggest that IgE levels and eosinophil counts are important factors in the evaluation of the atopic patient, with IgE having the greater impact in determining posttest probability of atopy. In our study, deviated nasal septum is found, in general, in 54.6% of the cases. This is in concordance with Gray and Fracs study [20], where there were 79% individuals with nasal deviation. DNS is commonly associated with patients with symptoms related to nasal obstruction with polyposis (81.8%) followed by nasal obstruction (71.4%), sneezing plus wheeze and sneezing.

### Conclusion

The predominant symptoms associated with Allergic Rhinitis are sneezing (90%), rhinorrhea (75%) and nasal congestion (48%). Patients also complain of symptoms like ocular itching, cough and post-nasal drip. Males (53.8%) are found to be slightly more commonly affected than Females (46.1%) The Mean Age of individuals is 33.12 years.

Allergic sensitization mediated by IgE is the basis of allergic diseases and hence, also of allergic rhinitis. Elevated total IgE can be included as a diagnostic criterion for allergic rhinitis. In general, adults and children with allergic rhinitis have been found to have higher total serum IgE concentrations as compared to non-atopic individuals. The IgE levels are elevated in more than 90% of patients with sneezing as the predominant symptom the IgE values are higher in patients with symptoms of sneeze plus wheeze as

compared to those with sneeze alone. Eosinophil counts are consistently higher in the allergic population and they are not influenced by gender, the presence of asthma, or of smoking IgE levels

greater than 140 IU/ml and eosinophil counts greater than 80 cells/ml are suggestive of an atopic aetiology for patients with signs and symptoms of rhinitis.

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