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ORIGINAL RESEARCH

A study to evaluate the levels of total immunoglobulin E and percentage count of eosinophil in allergic disease

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ABSTRACT

Aim: The present study aimed to evaluate the levels of total immunoglobulin E and the percentage count of eosinophils in patients with allergic diseases. **Methods:** This study was carried out at a tertiary care hospital for the period of 1 year, and 200 patients with allergic disease were classified into three groups (72 Asthma, 45 Rhinitis, and 83 Urticaria) and 100 individuals as a healthy control. **Results:** Patients with asthma, allergic rhinitis, and urticarial had significantly higher mean total blood IgE levels (p<0.01) compared to healthy controls (25.65 ± 5.75 IU/ml). Patients aged 30-39 with allergic asthma, rhinitis, and urticaria had significantly higher mean serum levels of T-IgE (P<0.05) compared to healthy controls (42.05 ± 17.43 pg/ml). Patients showed a substantial (p<0.05) rise in mean serum T-IgE across genders compared to healthy controls. Patients with allergic asthma, rhinitis, and urticaria had significantly higher eosinophil counts (4.36 ± 0.54%, 4.37 ± 0.52%, and 4.16 ± 0.45%) compared to healthy controls (2.56 ± 0.84%). **Conclusion:** The research observed elevated T-IgE and eosinophil counts in allergic disease serum. All allergic patients of all ages had significantly higher total IgE levels than healthy controls. Male and female T-IgE concentrations vary by allergic illness. Allergic asthma, rhinitis, and urticaria patients had a considerable rise in eosinophil percentage.

Keywords: Asthma, rhinitis, urticaria, immunoglobulin E, eosinophil

INTRODUCTION

Atopy is the genetic propensity to produce IgE antibodies in response to low-dose environmental stimuli such pollen, dust mites, and food allergies. Atopic dermatitis (AD), asthma, allergy rhinoconjunctivitis, and food allergies are common among atopic people.[1,2] Allergic march depicts atopic illness progression. Atopic babies may react and sensitise to allergens from birth. AD is usually diagnosed first, followed by food allergy. FA, seen in most AD patients, contributes to its aetiology. The table includes bronchial asthma and allergic rhinitis (AR) in later life due to respiratory allergy sensitivity.[3]

Allergic diseases are the most frequent paediatric chronic disorders. Epidemiological statistics reveal that allergy illnesses are rising as lifestyles and environments change in developed and emerging nations. Therefore, allergy testing is needed more.[2,4-6] Early diagnosis helps manage allergic illness optimally. Primary care doctors assess children initially. Seasonal AR and conjunctivitis may cause symptoms in certain youngsters. Recurrent vomiting in newborns may indicate allergies. This step involves deciding who, when, and how to undertake allergy diagnostic testing. Allergies are hypersensitivity reactions to particular allergens that begin with immunological processes.[7] IgE increases inflammation and allergic reactions.[8,9] Eosinophilia occurs in several ways. These include asthma, atopic disorders, helminth infections, medication hypersensitivity and neoplasms.10 IgE and eosinophil affect illness differently. IgE causes allergic asthma, and eosinophilia is a byproduct.[9] Total immunoglobulin E and eosinophil percentage were measured in various allergy diseases.

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MATERIALS AND METHODS

This study was carried out at tertiary care hospital for the period of 1 year and 200 patients with allergic disease were classified into three groups, (72 Asthma, 45 Rhinitis, and 83 Urticaria) and 100 individuals as a healthy control. Both physical and clinical examinations were done for each subject, and the information was recorded in a data sheet.

Blood samples were collected for estimation of serum total IgE by sandwich ELISA, read the results automatically by ELISA readers, the value over 100 IU/ml were considered high and the eosinophil counts were done by Beckman coulter analyzer, the percentage of eosinophil count below 4% was used as the reference value for normal levels of eosinophils. The sample results were calculated by using standard curve fitting equations for T-IgE.

STATISTICAL ANALYSIS

Descriptive statistics including percentage, mean and standard deviation were calculated using SPSS version 24.

RESULTS

Table 1: Level of total IgE in study groups

Study groups	No.	Range	T-IgE(IU/ml) Mean ± SE
Allergic asthma	72	12-568.32	508.42 ± 62.48
Allergic rhinitis	45	10-1000	444.76 ± 92.78
Allergic urticarial	83	11.43-1000	494.56 ± 66.64
Healthy control	100	10.5-56.61	25.65 ± 5.75
LSD value	248.52		
P-value	0.0052		

There was a highly significant (p<0.01) increase in the mean of total serum IgE in patients with asthma (508.42 ± 62.48 IU/ml), Allergic rhinitis (444.76 ± 92.78 IU/ml) and urticarial (494.56 ± 66.64 IU/ml) as compared with healthy controls (25.65 ± 5.75 IU/ml).

Table 2: Distribution of T-IgE in Allergic patients according to age groups

Age groups (years)	Healthy control		Asthma		Rhinitis		Urticaria	
	No.	T-IgE	No.	T-IgE	No.	T-IgE	No.	T-IgE
<20	12	29.04 ± 7.43	14	366.91 ±85.35	6	328.93 ±78.52	7	274.86 ± 52.78
20-29	38	33.30 ± 8.32	10	483.92 ± 62.28	11	472.83 ±92.58	21	462.74±72.94
30-39	22	42.05 ±17.43	28	556.04 ±88.12	11	513.94 ±72.49	23	501.26±112.8
40-50	20	23.43 ± 5.19	17	352.96 ±54.84	10	245.012 ±80.17	20	392.66±65.85
>50	8	30.0 ± 5.48	3	249.61 ±61.28	7	191.087 ±42.77	12	184.10 ±39.16
Total	100		72		45		83	
LSD value	--	28694	--	82.38	---	242.08	---	182.38

There are a significant (p<0.05) increase in mean serum level T-IgE in patients in age group (30-39 years) with allergic asthma (556.04 ± 88.12pg/ml), allergic rhinitis (513.93 ± 72.49pg/ml), and urticaria (503.26 ± 113.7 pg/ml), when compared with healthy controls (42.05 ± 17.43pg/ml).

Table 3: Distribution of T-IgE in Allergic patients according to gender groups

Gender	Healthy control		Asthma		Rhinitis		Urticaria		Total
	No.	T-IgE (IU/ml)	No.	T-IgE (IU/ml)	No.	T-IgE (IU/ml)	No.	T-IgE (IU/ml)	
Male	50	24.351±6.22	30	506.02 ±138.7	18	329.32±73.44	46	212.06 ±52.69	94
Female	50	17.308±4.93	42	432.18 ±84.68	27	511.39±103.6	37	412.95 ±91.74	106
Total	100		72		45		83		200
LSD value	--	12.38	--	62.48	--	122.58	--	136.94	---

There was a significant (p<0.05) increase in mean serum T-IgE in patients, through gender groups compared to the healthy control.

Table 4: The percentage of Eosinophil count in study groups

Groups	No.	Range	Eosin. (%)Mean ± SE
Allergic asthma	75	1-11	4.36 ± 0.54
Allergic rhinits	45	1-7	4.37 ± 0.52
Urticaria	83	1-9	4.16 ± 0.45
Healthy control	100	2-4	2.56 ± 0.84
LSD value	1.743		

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P-value	0.0525

There was a significant difference in percentage of eosinophil count in patients' groups allergic asthma 4.36 ± 0.54%, allergic rhinitis 4.37 ± 0.52%, and urticaria 4.16± 0.45% as compared with healthy control 2.56 ± 0.84%.

DISCUSSION

Rhinitis is a collection of nasal symptoms that may vary from moderate to severe, depending on the severity of the symptoms affected. The condition is referred to as allergic rhinitis when these symptoms are brought on by an allergen or allergens. An rising number of people are experiencing allergic rhinitis, which is a worldwide health concern.[11-13] It is an inflammatory condition of the nasal mucosa that is caused by exposure to allergens, which in turn may generate inflammation that is mediated by IgE activity.[13]

Mast cells, in particular, are involved in the development of asthma, which is a chronic allergic condition of the airways. Asthma influences a wide variety of cells and cellular components. Inflammation is the source of repeated symptoms such as shortness of breath, wheezing, chest tightness, and coughing. In most cases, there is a broad blockage of airflow associated with these episodic symptoms. This obstruction may be reversed to varied degrees either naturally or with therapy."14" An increase in the mean of total serum IgE was seen in patients with asthma (508.42 ± 62.48 IU/ml), allergic rhinitis (444.76 ± 92.78 IU/ml), and urticarial (494.56 ± 66.64 IU/ml) as compared to healthy controls (25.65 ± 5.75 IU/ml). This increase was found to be highly significant ($p<0.01$). When comparing the mean serum level of T-IgE in patients with allergic asthma (556.044 ± 88.12 pg/ml), allergic rhinitis (513.934 ± 72.49 pg/ml), and urticaria (503.262 ± 113.7 pg/ml) with healthy controls (42.05 ± 17.43 pg/ml), it is seen that there is a substantial rise ($p<0.05$) seen in the mean serum level of T-IgE in patients in the age range of 30 to 39 years old. AL-Yasiri[15] discovered that the prevalence of allergic illness was decreased at the most advanced ages, both in control subjects and in those who were afflicted by allergy respiratory, allergic rhinitis, and urticaria.

An increase in mean serum T-IgE was seen in patients across all gender categories, as compared to the healthy control group. This increase was statistically significant ($p<0.05$). According to the findings of a study conducted by Huang *et al.*[16] in the United States, who stated that asthma is more prevalent in males than in females, and Khan *et al.*[17] in Pakistan, who came to the conclusion that the frequency of allergic rhinitis was significantly different in both genders and found in females more than males, the prevalence of allergic asthma was found to be higher in males than in females. When comparing the percentage of eosinophil count in patients with allergic asthma, which was 4.36 ± 0.54%, allergic rhinitis, which was 4.37 ± 0.52%, and urticaria, which was 4.16 ± 0.45%, to the healthy control, which was determined to be 2.56 ± 0.84%, there was a significant difference.

CONCLUSION

Eosinophil count and T-IgE levels in the serum of allergic illness were found to be elevated, according to the findings of the research. All of the allergic patients, regardless of their age, had a significantly elevated level of total IgE as compared to the healthy controls. According to the allergic illness, the concentration of T-Ig differed between males and females according to the condition. In individuals who suffered from allergic asthma, rhinitis, and urticaria, there was a discernible rise in the percentage count of eosinophils.

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