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Pattern of Allergic Diseases in Children.

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ABSTRACT

The pattern of allergic disease in 100 children was compared their symptoms with markers like AEC, NEC, PSE and serum IgE levels. Allergic rhinitis, atopic dermatitis and food allergy were equal in all age groups in children less than 15 years, but the occurrence of bronchial asthma increased from under 5 years of age group to 11-15 yearsof age group.Allergic diseases were more common in males compared to females, except bronchial asthma, which was common in females.Allergic rhinitis is the most common allergic disease in children followed by bronchial asthma, atopic dermatitisand food allergy.Dust exposure was the most common triggering factor for allergic rhinitis and physical activity was the commonest triggering factor for bronchial asthma.Serum IgE, AEC, PSE and NEC were significantly elevated with the increasing severity of allergic rhinitis and bronchial asthma.

Keywords: Allergic Rhinitis, Bronchial Asthma ,IgE levels

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INTRODUCTION

The term allergy (from the Greek, 'allos' meaning 'other', and 'ergon' meaning 'reaction') was coined and described as "*any form of altered biological reactivity*" by an Austrian Paediatrician – Clemens Von Pirquet in 1906 [1]. Allergy is a hypersensitivity disorder of the human body's immune system. Allergic reactions occur when a person's immune system reacts abnormally to normally harmless substances, present in the environment. A substance that causes a reaction is called an allergen. Allergy is formally called type I (or immediate) hypersensitivity and is one of four forms of hypersensitivity [2]. Allergy represents a major health problem affecting more than 25% of the population worldwide. Allergic patients (type I) are characterized by the increased production of immunoglobulin E (IgE) antibodies against antigens (allergens) from different sources, e.g., pollen, mites, fungi, insects, animal dander and foods. The type I allergy (immediate) leads to allergic manifestations, e.g., allergic rhinitis, asthma, atopic dermatitis and anaphylactic shock triggered by allergen-induced cross-linking of effector cell-bound IgE antibodies and the release of inflammatory mediators such as histamine and leukotrienes [3]. Allergic diseases affect an individual in terms of quality of life, work performance and productivity. The prevalence of atopic diseases has increased in many industrialized countries during the past few decades [4]. The burden of allergic diseases in India has been on an uprising trend in terms of prevalence as well as severity. These allergic diseases comprise of asthma, rhinitis, food allergy and atopic dermatitis. Approximately 20% to 30 % of the total population suffers from at least one of these allergic diseases in India.

The WHO International Reference Centre for Immunoglobulins announced the presence of a fifth immunoglobulin isotype, IgE. IgE is a class of antibody that plays an important role in allergy and is especially associated with type I hypersensitivity. The IgE is capable of triggering the most powerful immune reactions [5]. Studies have shown that condition such as asthma, allergic rhinitis, eczema, urticaria, atopic dermatitis and some parasitic infections lead to increased IgE levels. Estimation of serum immunoglobulin E (IgE) level is a valuable diagnostic parameter in Allergic Asthma and allergic rhinitis [6]. IgE determination is valuable in the diagnostic assessment of patients with established or suspected allergic diseases [7, 8].

Hence the purpose of this study is to identify the pattern of allergic disease and correlate the symptoms with the blood markers (IgE, Absolute eosinophil count, Nasal smear for eosinophils).

MATERIALS AND METHODS

This is a cross sectional study conducted in 100 children of age group 2 months to 15 years in SreeBalaji Medical College and Hospital during the period August 2013 – July 2014. Sick child and child with immunodeficiency/cancer were excluded from the study. The details of the study were explained and informed consent was obtained from the parents / the guardian of the children included in the study. Proforma was filled, which included details of the children and examination findings. Investigation like absolute eosinophil count (AEC), nasal eosinophil count (NEC), Smear for eosinophil count (SFE) and serum IgE assay was done in our laboratory. Statistical analysis was done by Chi-square test and student t test.

RESULTS

A cross-sectional study consisting of 100 children aged 2 months to 15 years were included in our study. The pattern of allergic diseases in children and their relation to the serum IgE level, Absolute eosinophil count (AEC), Smear for eosinophil count (SFE) and Nasal eosinophil count (NEC). In this study, 52% of children were in 2 months to 5 years age group, 34% were in 6 to 10 years age group and 14% were in 11 to 15 years age group. Allergic rhinitis, atopic dermatitis, food allergy were more common in 2 months to 5 years age group which was 57.7%, 17.3%, 15.4% respectively. Bronchial asthma was more common in 11-15 yr age group which was 71.4%. Allergic rhinitis (60%), food allergy (12.7%) was more common in males and bronchial asthma (55.6%), atopic dermatitis (15.6%) was more common in females.

Dust (56%) and animal dander (70.6%) were the most common triggering factors for allergic rhinitis. Physical activity (100%) and weather change (47.0%) were the most common triggering factors for bronchial asthma. Food (50%) was the main triggering factor in food allergy.

AEC (517.88), IgE (1261.7), SFE (5.36) and NEC (14.3) are higher in allergic rhinitis with significant p value 0.006, <0.001, 0.020 and 0.0 as showed in table1. AEC (534.3), IgE (1301.8), SFE (5.96) and NEC (18.78) are significantly higher in bronchial asthma with significant p value 0.003, <0.001, <0.001 and 0.001 as showed in table 2. AEC (373.23), IgE (874.9) are lesser in atopic dermatitis with insignificant p value of 0.118, 0.100 respectively and SFE (3.69) was also less in atopic dermatitis but with a significant p value of 0.035 as showed in table 3. AEC (351.5), IgE (561.4) and SFE (3.30) are lesser in food allergy with significant p value of 0.095, <0.001, and <0.001 as showed in table 4.

Table 1: Student T-test to compare mean values for allergic rhinitis

Variables	ALLERGIC RHINITIS	N	Mean	Std. Deviation	t-value	P-Value
AEC (cells/cumm)	Present	56	517.88	241.71	2.786	0.006
	Absent	44	395.89	181.422		
IgE (IU/ml)	Present	56	1261.68	469.091	4.949	<0.001
	Absent	44	843.327	376.2317		
Smear for eosinophils (%)	Present	56	5.36	2.339	2.374	0.02
	Absent	44	4.32	1.938		
NEC (cells/hpf)	Present	56	14.3	9.101	-	-
	Absent	0	.	.		

Table 2: Student T-test to compare mean values for bronchial asthma

Variables	BRONCHIAL ASTHMA	N	Mean	Std. Deviation	t-Value	P-Value
AEC (cells/cumm)	Present	47	534.3	255.694	3.06	0.003
	Absent	53	402.04	172.765		
IgE (IU/ml)	Present	47	1301.79	410.652	4.92	<0.001
	Absent	53	878.796	444.7867		
Smear for eosinophils (%)	Present	47	5.96	2.274	4.993	<0.001
	Absent	53	3.96	1.709		
NEC (cells/hpf)	Present	23	18.78	9.175	3.348	0.001
	Absent	33	11.18	7.748		

Table 3: Student T-test to compare mean values for atopic dermatitis

Variables	ATOPIC DERMATITIS	N	Mean	Std. Deviation	t-Value	P-Value
AEC (cells/cumm)	Present	13	373.23	168.462	1.577	0.118
	Absent	87	477.79	229.536		
IgE (IU/ml)	Present	13	874.846	447.9235	1.658	0.1
	Absent	87	1107.899	475.9283		
Smear for eosinophils (%)	Present	13	3.69	1.797	2.138	0.035
	Absent	87	5.08	2.232		

Table 4: Student T-test to compare mean values for food allergy

Variables	FOOD ALLERGY	N	Mean	Std. Deviation	t-Value	P-Value
AEC (cells/cumm)	Present	10	351.5	154.092	1.688	0.095
	Absent	90	476.72	228.342		
IgE (IU/ml)	Present	10	561.44	312.6403	3.853	<0.001
	Absent	90	1134.953	457.9095		
Smear for eosinophils (%)	Present	10	3.3	0.675	5.213	<0.001
	Absent	90	5.08	2.265		

In our study, allergic rhinitis (33%) is the most common allergic disease followed by bronchial asthma (21%), atopic dermatitis (10%), food allergy (10%) and the association of allergic rhinitis and bronchial asthma is the commonest Co-morbid condition as showed in table 5.

Table 5: Frequency distribution of allergic diseases

	N	%
Allergic rhinitis	33	33.0
Bronchial asthma	21	21.0
Atopic dermatitis	10	10.0
Food allergy	10	10.0
AR+BA	23	23.0
BA+AD	3	3.0
Total	100	100.0

DISCUSSION

Allergic diseases are fairly common cases in paediatric outpatient department. The diagnosis of allergic diseases can be done with appropriate history and detailed examination. To confirm the allergic nature of disease complicated tests like skin prick test, RAST etc, may not be possible in many hospitals. Hence, simple test like serum IgE level, absolute eosinophil count, peripheral smear for eosinophil count and nasal eosinophil count are used to confirm the allergic nature of the disease.

This study discusses the pattern of allergic diseases in children and their relation to serum IgE level, nasal eosinophil count, absolute eosinophil count and peripheral smear for eosinophil count. The results were analysed as follows;

In our study, exposure to dust was the most common triggering factor for allergic rhinitis (66.1%), followed by weather (48.3%) but the P-value was not significant. Food intake and physical activity was unrelated to allergic rhinitis. This was in contrast to the study done by Ruby Pawankar et.al, in which they found pollens as the most common trigger factor [9].

For bronchial asthma, physical activity was found to be the most common triggering factor with a statistically significant P value of <0.001. Weather change was seen in 65% (P – 0.018) and dust exposure in 48.2% (P – 0.784) of bronchial asthma patients. This is in contradiction to Ruby Pawankar et.al who found dust exposure was the most common trigger for bronchial asthma [10].

Exposure to specific foods was the trigger for food allergy (P<0.001). No specific trigger can be found for atopic dermatitis due to less number of cases.

In this study, allergic rhinitis patients had elevated absolute eosinophil count (M - 517.88, SD - 241.7), serum IgE level (M - 1261.6, SD - 469.1), smear for eosinophils (M – 5.36, SD – 2.3), nasal eosinophil count (M – 14.3, SD – 9.1) which shows statistically significant P values of 0.006, <0.001, 0.020 respectively. This was in correlation to the study done by Sudha S Deo and others, that patients with associated other allergic diseases had significantly elevated markers. Significant or increased eosinophil percentage was seen when compared to controls. Significant increase in total IgE was observed in different allergic groups when compared to normals (p < 0.001) [11].

Similarly bronchial asthma patients had elevated absolute eosinophil count (M - 534.3, SD – 255.7), serum IgE level (M - 1301.7, SD - 410.6), smear for eosinophils (M - 5.96, SD - 2.77) and nasal eosinophil count (M - 18.78, SD - 9.17) with statistically significant P values of 0.003, <0.001, <0.001 and 0.001 respectively. Similarly in bronchial asthma the mean values of the markers increased with the severity of the asthma with a statistically significant P values of <0.05. Highest level of serum IgE and absolute eosinophil count level were found in moderately persistent asthma. Study by Sandeep.T, Roopakala M S, Rayappa C et al. Showed mean IgE levels ranged from 151.95 IU/ml in normal subjects to 1045.32 IU/ml in severe asthmatics. They concluded the study stating that serum IgE levels were high in asthmatics as compared to normal subjects and serum IgE levels increased as the severity of asthma increased [12].

In atopic dermatitis the marker levels were lower in associated co-morbid conditions. This was in contradiction to other studies. This is probably due to less number of patients in our study. Hence a bigger sampling study is required.

In food allergy also the blood markers were reduced in co-morbid conditions as compared with food allergy alone, probably due to less number of patients in our study.

CONCLUSION

In the present study, we assessed the pattern of allergic disease in 100 children and compared their symptoms with markers like AEC, NEC, PSE and serum IgE levels. Allergic rhinitis, atopic dermatitis and food allergy were equal in all age groups in children less than 15 years, but the occurrence of bronchial asthma increased from under 5 years of age group to 11-15 years of age group. Allergic diseases were more common in males compared to females, except bronchial asthma, which was common in females. Allergic rhinitis is the most common allergic disease in children followed by bronchial asthma, atopic dermatitis and food allergy. Dust exposure was the most common triggering factor for allergic rhinitis and physical activity was the commonest triggering factor for bronchial asthma. Serum IgE, AEC, PSE and NEC were significantly elevated with the increasing severity of allergic rhinitis and bronchial asthma. Patients with Co-morbid allergic diseases had significantly elevated serum IgE, AEC, PSE and NEC compared to patients with single allergic disease.

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