



A STUDY OF ALLERGEN-SPECIFIC IGE ANTIBODIES IN ATOPIC PATIENTS ATTENDING TERTIARY CARE CENTRE, COCHIN

Immunology

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ABSTRACT

Background: Atopic allergic diseases are chronic, relapsing and often associated with the hyperproduction of IgE antibodies to various allergens. Identification of these allergens is possible by various laboratory investigations.

Aim: To determine the prevalence of IgE antibodies specific for food and inhalation allergens in atopic allergic condition.

Methods: This prospective study comprised 140 patients of which 67.85% individuals were positive for specific IgE antibodies and these were selected for analysis. The diagnosis was made by an in vitro assay Enzyme Allergo Sorbent Test.

Results: On analysis 52.63% patients were positive for food allergens, 20% for aero allergens and 27.36% positive for both food and aero allergens. In food allergy, main allergens are egg yolk, milk powder and coffee. Among aero allergens, there was increased prevalence of dog; pigeon feather and jute.

Discussion: The patients chosen for this study (n=95) had the following atopic diseases: urticaria, atopic dermatitis, allergic rhinitis and asthma. In the food allergens test 96% of patients showed allergy to egg yolk, milk powder and coffee. In the aero allergen test 94.7% of patients showed allergy to false ragweed, dog, pigeon feather and jute. The P-value is significant for both eosinophil count and total IgE (p<0.001).

Conclusion: The present study suggests that it is important to study the serum IgE levels in all the allergic patients as it directly correlates with the proportion of IgE concentration in circulation. Identification of food allergens is important in the diagnosis of atopic diseases in children in India. Allergen profile with regard to inhalants in Indian patients was similar to that of other studies.

KEYWORDS

Allergen, Enzyme Allergo Sorbent Test, IgE antibody, atopy

INTRODUCTION

Hypersensitivity is a set of undesirable reactions produced by the normal immune system including allergies and autoimmune diseases. One such reaction is allergy mounted by the immune system.¹ It occurs when a person's immune system reacts to substances in the environment that are harmless for most of the people. These substances are known as allergens and are found in pets, pollen, house dust mites, insects, foods and few medicines. Atopy is the genetic tendency to develop allergic diseases. In few people, severe allergies to environmental or dietary allergens can lead to life-threatening reactions.^{2,3}

A large number of individuals mount significant IgE responses only as a defense mechanism against parasitic infections. Serum IgE levels increase and remain high until the parasite is successfully cleared from the body.

Certain individuals who develop an abnormality such as atopy have shown to have a hereditary predisposition to the development of immediate hypersensitivity reactions against common environmental antigens. The abnormal IgE response of atopic individuals is at least partly genetic as it often runs in families. It is seen that circulating IgE levels are increased in atopic individuals. Patients with atopic disease include allergic asthma, allergic rhinitis, atopic dermatitis (AD) and urticaria, which show the presence of IgE in serum. An allergen is any substance that causes an abnormally vigorous immune response when it enters our body and believed to contribute to morbidity and mortality in man. Epidemiological investigations of allergen sensitivity in a community based population and an industrial setting have shown the incidences of atopic diseases.⁴⁻¹⁰

However, there are not many studies showing the relationship between specific IgE and total IgE in different atopic conditions.

Not many studies have been conducted on total and specific IgE in India, though IgE is considered as a marker of allergy. Diseases such as bronchial asthma, allergic rhinitis, and AD are dramatically increasing all over the world including developing countries like India.^{11,12} In the last decades, many studies^{4,13} have shown an increase in the prevalence of allergic rhinitis and asthma mainly in urban communities, especially in industrialised countries. The prevalence rates of sensitization to different atopic allergens have not been well studied especially in India. The present study was thus undertaken to observe the incidences of different allergic conditions and to find the

immunological changes with respect to environmental pollutants.

Materials and Methods

Objectives:

Primary objective:

To determine the prevalence of IgE antibodies specific for food and inhalation allergens in any atopic allergic condition.

Secondary objectives:

1. To correlate the prevalence of IgE antibodies specific for food and inhalation allergens in different allergic conditions.
2. To correlate the percentage of eosinophils, WBCs and total IgE in patients sensitized to food and inhalation allergens.

Study design: Hospital based prospective study

Study Period: January 1st 2016 to December 31st 2016.

Study population: All patients with symptoms suggestive of different allergic conditions, examined by Chief Allergologist.

Inclusion criteria: 140 consecutive patients suffering from atopic allergic diseases were included in the study.

Exclusion criteria: Patients on topical or oral steroids or immunosuppressive drugs

Sample size: Based on the prevalence rate of IgE antibodies specific for food and inhalation allergens with cut-off value of 0.35kU/L, reported from an earlier study⁶⁻⁸ and with 20% allowable error and 99% confidence, maximum sample size comes to 140.

IgE: immunoglobulin E; kIU/L: kilo international units/liter (= IU/mL).

Patient's questionnaire included a detailed history for each patient regarding the type, duration of symptoms, the frequency and severity of exacerbations including smoking habits and previous medical history - collected from the respective departments.

Serum samples were collected from the allergic patients.

Statistical analysis:

SPSS package of version 20 was used for analyses of the data and

statistical significance was calculated by using Kruskal Willis method for non-parametric data and anova for parametric data (second objective) and Spearman's Rank correlation method for non – parametric data (third objective).

By using a digital evaluation system, the intensity of bands was calculated in EAST (Enzyme-Allergo-Sorbent Test) classes of 0-6. The classes were divided into concentrations as indicated in **Table 2**. IgE levels were determined by using an enzyme-linked fluorescent assay, reference levels being ≤ 120 kIU/L.

Food	Inhalants
Cow's milk	Timothy grass
Egg yolk	Cultivated rye
Cow's milk powder	Corn
Wheat flour	Eucalyptus
Rice	False ragweed
Soya bean	Carnation flower
Peanut	Sunflower
Coconut	Mite mix 1
Apple	Der. Far (mite)
Grape	Cockroach
Potato	Cat
Spinach	Dog
Onion	Pigeon feathers
Cucumber	Chicken feathers
Chicken meat	Aspergillus furn
Mustard	Trichophyton ment,
Coffee	Cotton yarn
Ginger	Cotton yarn
Shrimp	Straw dust
	Jute
	Sheep's wool

IgE class	IgE concentration (kIU/L)
0	<0.35
1	0.35 to 0.7
2	0.7 to 3.5
3	3.5 to 17.5
4	17.5 to 50
5	50 to 100
6	>100

RESULTS

A total of **140 samples** were tested for specific IgE antibodies against food and aero allergens for this study. Out of these, 95 (67.85%) individuals were positive for specific IgE antibodies and these were selected for analysis. On analysis, we found 50 (52.63%) patients positive for food allergens, 19 (20%) for aero allergens and 26 (27.36%) positive for both food and aero allergens. (**Fig 1**)

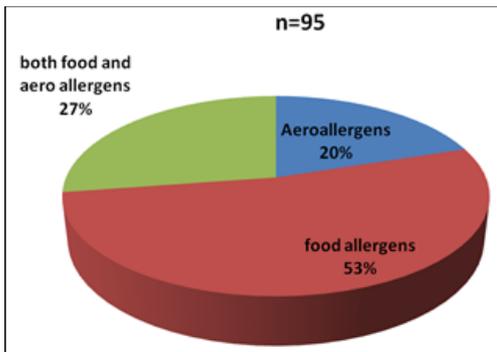
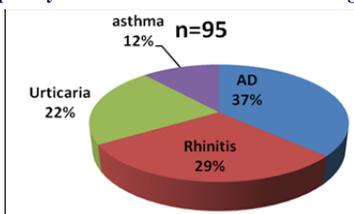


Fig 1: Frequency of sensitisation to the tested allergens



AD= atopic dermatitis.

Fig 2: Percentage distribution of atopic diseases.

The percentage of AD was higher when compared to asthmatics. But when compared to allergic rhinitis and urticaria the prevalence rate of AD was 1.25 and 1.66 times more respectively. The present study also showed that the value of specific IgE to food allergens is two and half times more when compared to value of specific IgE to aeroallergens.

The study population showed high prevalence rate in the age group of 31-40 years with mean age of 10.55 years. However there was no significant difference between prevalence rates of male and female population

The prevalence rate of atopic phenotype is more common among paediatric age group when compared with respect to age groups. We observed positive trends mainly against aeroallergens and prevalence rate increases with age as shown in Fig 3.

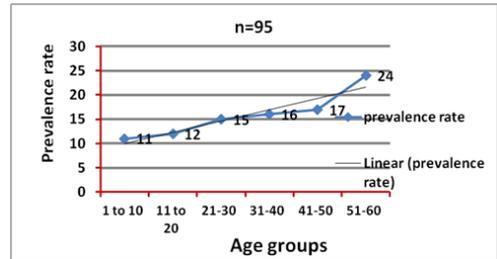


Fig 3: Age-dependent distribution of the aeroallergens
The data showing increased prevalence(>90%) in patients with food allergens are egg yolk(EG) , milk powder(MP) , coffee (CO) as shown in Table 3(A).

Food allergens	Positive (%)
Egg yolk(EY)	48 (96)
Milk powder(MP)	48 (96)
Wheat flour(WF)	33 (66)
Rice (R)	43 (86)
Soyabean(SO)	42 (84)
Peanut (PE)	33 (66)
Apple (A)	39 (78)
Grape (G)	44 (88)
Potato(PO)	33 (66)
Spinach(SP)	37 (74)
Cucumber(CU)	40 (80)
Mustard(MU)	42 (84)
Coffee(CO)	48 (96)
Ginger(GI)	44 (88)
Crab(C)	18 (36)
Prawn(PW)	31 (62)

Table 3(A) showing prevalence for food allergens.

Among the aero allergens, there is increased prevalence (>90%) of dog (DO), pigeon feather (PF) and jute (J) as illustrated in table 3(B).

The data showing increased prevalence (>90%) for both food & aero allergens was grapes (G) and Aspergillus fumigates (AF) as shown in Table 3(C).

Table 3(B) showing prevalence for aero allergens

Aero allergens	Positive (%)
Timothy grass(TG)	13 (68.4)
Cultivated rye(CR)	12 (63.2)
Cultivated corn(CC)	14 (73.7)
False ragweed(FR)	18 (84.7)
Sunflower(SU)	17 (89.5)
House dust mite 1(HDM)	6 (31.6)
Dermatophagoides farina(DF)	9 (47.4)
Cockroach,german(CG)	7 (36.8)
Cat(CA)	17 (89.5)
Dog(DO)	18(94.7)

Pegion feather(PF)	18 (94.7)
Trichophyton mentagrophytes(TM)	16 (84.2)
Straw dust (SD)	16 (84.2)
Jute(J)	18 (94.7)
Sheepwool(SW)	13 (68.4)

In the food allergens test 96% of patients showed allergy to egg yolk (EY), milk powder (MP) and coffee (CO). More than 80% of patients

showed allergy to rice (R), soyabean (SO), grape (G), cucumber (CU), mustard (MU) and ginger.

Among the aero allergens, there is increased prevalence (>90%) of dog (DO), pigeon feather (PF) and jute (J).

The data showing increased prevalence (>90%) for both food & aero allergens was grapes (G) and Aspergillus fumigates (AF) as shown in Table 3©.

Table 3(C) showing prevalence for both food and aero allergens

Sl no	Allergens (food and inhalants)	Positive(%)
1	Crab(C)	8 (30.8)
2	Prawn(PW)	19 (73.1)
3	Wheat flour(WF)	19 (73.1)
4	Peanut(PE)	16 (61.5)
5	Potato(PO)	10 (38.5)
6	Spinach(SP)	18 (69.2)
7	Cucumber(CU)	20 (76.9)
8	Grape(G)	24 (92.3)
9	Jute(J)	23 (88.5)
10	Apple(A)	20 (76.9)
11	House dust mite 1(HDM)	11 (42.3)
12	Onion(O)	23 (88.5)

13	Trichophyton mentagrophytes(TM)	21 (80.8)
14	Mustard(MU)	19 (73.1)
15	Rice (R)	19 (73.1)
16	Chicken feathers(CF)	19 (73.1)
17	Soyabean(SO)	20 (76.9)
18	Sheepwool(SW)	23 (88.5)
19	Ginger(GI)	22 (84.6)
20	CCD maker(CD)	23(85.5)
21	Cat(CA)	22 (84.6)
22	Milk powder(MP)	23 (85.5)
23	Chicken(CH)	23 (85.5)
24	Egg yolk(EY)	23 (85.5)

Table 4A showing general characteristics of patients with total & specific IgE for food allergens. Values are in mean±standard deviation.

Condition	Age (yrs)	Sex (F/M)	WBC (/L)	Eosinophil (%)	Total IgE (IU/ml)	EY	MP	WF	R	SO
Atopic dermatitis(18)	23.84	5/12	8.27± 1.65	11.42± 6.32	563.67± 229.68	0.37±0.86	0.00±0.54	0.74± 0.39	0.18± 0.53	0.67± 1.42
Urticaria(23)	32.69	12/11	8.56± 1.28	8.64± 5.25	619.16± 175.85	0.35±0.00	0.38±0.16	3.09± 6.89	0.62± 1.10	1.38± 4.72
Asthma(6)	34.66	4/2	7.32± 1.24	9.24± 3.82	465.96± 119.74	0.35±0.00	0.35±0.00	1.19± 1.22	0.66± 0.37	1.25± 0.93
Rhinitis(3)	41.34	2/1	7.44± 1.24	5.71± 5.91	468.61± 1.75	0.35±0.00	0.35±0.00	0.43± 0.14	0.35± 0.00	0.35± 0.00
Normal(37)	35.78	19/18	8.67± 1.65	5.67± 1.16	333.04± 39.88	0.35±0.00	0.35±0.00	0.35± 0.00	0.35± 0.00	0.35± 0.00
P – value	0.230	0.001*	0.001*	0.101	0.229	0.001*	0.001*	0.001*		

PE	A	G	PO	SP	CU	MU	CO	GI	C	PW	CM
4.02± 0.89	1.38± 0.55	0.56±2.56	8.37± 0.66	1.23± 0.44	0.34± 0.54	0.44±0.36	0.03±0.35	0.00±3.55	9.77± 7.28	23.61±0.41	0.27±0.00
3.42± 9.87	0.88± 1.99	0.35±0.00	3.56± 2.44	1.13± 3.36	0.56± 0.88	0.41±0.17	0.36±0.03	0.42±0.22	5.43± 9.39	1.31± 3.55	0.56±0.73
1.54± 1.34	0.64± 0.35	0.35±0.00	7.58± 0.80	1.56± 1.50	0.72± 0.61	0.53±0.31	0.35±0.00	0.35±0.00	24.70±24.96	9.46± 2.31	0.50±0.23
0.39± 0.07	0.39± 0.07	0.35±0.00	0.83± 0.84	0.47± 0.20	0.55± 0.18	0.39±0.07	0.35±0.00	0.35±0.01	7.95± 2.18	0.35± 0.00	0.43±0.14
0.35± 0.00	0.35± 0.00	0.35±0.00	0.35± 0.00	0.35± 0.00	0.35± 0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35± 0.00	0.35± 0.00	0.35±0.00
0.001*	0.005	0.028	0.001*	0.001*	0.002*	0.019	0.674	0.090	0.001*	0.001*	0.023

EY – Egg yolk ,MP– Milk powder ,WF – Wheat flour ,R – Rice , SO – Soybean ,GI – Ginger ,PE – Peanut , CO – Coffee ,A –Apple, MU – Mustard, PO –Potato ,CU– Cucumber, G – Grape ,O – Onion , PW - Prawn ,CM – CCD maker ,C – Crab ,SP – Spinach

Table 4 (B) showing general characteristics of patients with total & specific IgE for aero allergens. Values are in mean± standard deviation

Conditions	Age (yrs)	Sex (F/M)	WBC (/L)	Eosinophils (%)	TotalIgE (IU/ml)	TG	CR	CC
Atopic dermatitis(4)	26.75	3/1	9.73± 1.44	11.25±7.45	626.07± 27.78	0.38± 0.06	0.35± 0.00	0.38± 0.06
Urticaria(4)	29.01	3/1	9.37± 1.47	5.28±5.86	546.15± 95.47	0.44± 0.12	0.41± 0.06	0.38± 0.06
Asthma(5)	29.01	3/2	8.61± 1.94	7.25±5.36	713.06± 86.29	0.58± 0.52	0.43± 0.15	0.51± 0.34
Rhinitis(6)	39.01	2/4	9.37± 2.95	7.71±3.75	694.12± 93.81	0.41± 0.14	0.37± 0.04	0.47± 0.31
Normal(2)	36.51	2/0	10.85± 0.35	6.21±0.43	327.91± 53.74	0.35± 0.00	0.35± 0.00	0.35± 0.00
P - Value	0.781		0.606	0.180		0.722	0.717	0.870

FR	SU	HDM	DF	CG	CA	DO	PF	TM	SD	J	SW
0.42±0.13	0.35±0.00	0.42±0.06	0.92±1.05	0.84±0.91	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.44±0.17
0.35±0.00	0.35±0.00	0.75±0.41	0.46±0.23	0.38±0.05	0.35±0.01	0.38±0.06	0.35±0.00	0.38±0.05	0.38±0.06	0.35±0.00	0.42±0.06
0.35±0.00	0.35±0.01	3.28±4.31	4.41±5.19	0.43±0.06	0.98±1.41	0.35±0.00	0.35±0.00	0.51±0.34	0.35±0.00	0.37±0.05	0.44±0.21
0.35±0.00	0.75±1.01	6.74±8.43	5.66±7.27	0.39±0.09	0.35±0.00	0.35±0.00	0.37±0.04	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00
0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00
0.373	0.751	0.259	0.314	0.519	0.588	0.373	0.645	0.236	0.706	0.525	0.302

**Timothy grass, CR – Cultivated rye ,DO - Dog, CA – Cat,PF – Pigeon feathers CC – Cultivated com ,FR – False ragweed ,TM – Trichophyton mentagrophytes, SU –Sunflower ,SD – Straw dust, HDM – House dustmite 1, J - Jute,DF – Dermatophagoides farina, SW – Sheepwool, CG – Cockroach,german, E – Eucalyptus.

Among aero allergens group maximum number of patients were presented with allergic rhinitis (n=6) followed by asthma (n=5). All the patients had higher than normal values for total IgE. The maximum total IgE was obtained in asthma (713.06±186.29IU/ml), followed by allergic rhinitis (694.12±193.81IU/ml) then atopic dermatitis (626.07±27.78IU/ml)and urticaria (546.15±195.47IU/ml). In this group P-value showed no significance in any of the parameters Table 4(B).

Among the patients with both food and aero allergens maximum numbers of patients were presented with atopic dermatitis. The total IgE values obtained from the normal control group was 327.33±38.71IU/ml which was under normal limit. All clinical conditions had above normal values. Thus the P-value were significant (<0.001) for total IgE in this group Table 4©.

Table: 4(C): Data showing general characteristics of patients with total & specific IgE for both food & aero allergens

Conditions	Age (yrs)	Sex (F/M)	WBC (/l)	Eosinophils (%)	Total IgE (IU/ml)	C	PW	WF	PO	PE
Atopic dermatitis(10)	27.91	3/7	7.91±1.44	10.78±7.5	703.19±167.05	6.09±9.25	4.12±12.14	3.36±9.36	7.18±18.14	9.66±18.97
Urticaria(9)	26.01	5/4	8.63±3.05	6.73±4.62	554.41±211.19	2.54±3.53	0.41±0.12	1.61±2.18	6.14±11.27	2.64±4.43
Rhinitis(7)	45.43	4/3	9.15±3.09	6.56±3.44	495.47±138.12	4.79±11.13	7.87±19.98	0.52±0.44	1.85±3.85	0.79±1.065
Normal(6)	30.67	4/2	8.86±1.39	6.16±0.73	327.33± 38.71	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00
P - Value	0.734	0.224	0.001*	0.013	0.308	0.383	0.080	0.294		

SP	CU	G	A	O	MU	R	SO	GI	CD	MP	CH	EY
3.14±8.39	0.88±1.65	0.38±0.12	0.87±1.66	0.54±0.58	1.68±3.48	2.07±5.42	1.74±4.14	0.38±0.12	0.37±0.07	0.35±0.00	0.35±0.01	0.78±1.34
1.87±3.44	0.68±0.68	0.35±0.00	0.73±0.76	0.36±0.04	0.76±1.06	0.85±0.99	0.86±1.02	0.43±0.13	1.42±2.73	0.37±0.05	0.35±0.00	0.35±0.00
0.56±0.36	0.36±0.04	0.52±0.43	0.55±0.54	0.35±0.00	0.36±0.04	0.61±0.54	0.38±0.09	0.35±0.00	0.35±0.00	0.35±0.01	0.42±0.12	0.35±0.01
0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00
0.487	0.514	0.574	0.182	0.419	0.360	0.482	0.502	0.169	0.365	0.307	0.194	0.382

TG	CR	CC	E	FR	SU	CG	DF
15.52±30.12	10.71±21.15	6.15± 16.86	0.68± 1.03	1.68±5.15	4.46±12.16	0.91±0.84	10.77±17.73
12.69±21.16	9.53± 17.31	5.55± 7.93	0.41± 0.12	1.01±1.26	1.35±2.74	0.38±0.08	0.08± 1.28
1.11± 1.98	0.81± 1.19	0.75± 1.07	0.35± 0.01	0.41±0.14	0.47±0.27	2.02±4.18	4.18± 16.28
0.35± 0.00	0.35± 0.00	0.35± 0.00	0.35± 0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35± 0.00
0.181	0.178	0.215	0.651	0.450	0.645	0.005	0.108

J	HDM	TM	SD	CF	SW	AF	C
0.49±0.45	9.26± 15.65	0.73±0.91	0.38±0.12	0.44±0.15	1.27±2.93	0.47±0.36	11.28±24.89
0.37±0.07	2.23± 5.35	0.35±0.00	0.36±0.04	0.43±0.15	0.66±0.94	0.35±0.00	0.38± 0.12
0.35±0.00	14.55±15.55	0.42±0.16	0.35±0.00	0.36±0.04	0.35±0.00	0.35±0.00	0.35± 0.00
0.35±0.00	0.35± 0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35±0.00	0.35± 0.00
0.419	0.095	0.166	0.455	0.388	0.419	0.209	0.203

Table 5 with respect to groups gives correlation analysis, of the percentage of eosinophils, WBC, total IgE in different groups.

Table 5(A) Correlation between WBC, Eosinophils, and Total IgE for food allergens

Conditions	WBC(A)	Eosinophils(B) (%)	Total IgE(C) (IU/ml)	Spearman's correlation	P-value
A Vs C B Vs C	A Vs C B Vs C				
Atopic dermatitis(18)	8.27±1.65	11.42±6.32	563.67±229.68	0.205 0.001*	0.19 0.71
Urticaria(23)	8.56±1.28	8.64±5.25	619.16±175.85	-0.299 0.008	0.271 0.856
Asthma(6)	7.32±1.24	9.24±3.82	465.96±119.74	0.143 - 0.543	0.499 0.714
Rhinitis(3)	7.44±1.24	5.71±5.91	468.61±143.75	-0.500 - 1.001	0.895 0.595
Normal(37)	8.67±1.65	5.67±1.16	333.04±39.88	0.188 -0.090	0.126 0.906

Table 5 (B): Correlation between WBC, Eosinophil, Total IgE for aero allergens

Conditions	WBC(A)	EOSINOPHIL S (B) (%)	TOTAL IgE(C)	Spearman's correlation	P-value
A Vs C B Vs C	A Vs C B Vs C				
Atopic dermatitis(4)	9.73±1.44	11.25±7.45	626.07±227.78	0.400 -0.400	0.093 0.228
Urticaria(4)	9.37±1.47	5.28±5.86	546.15±195.47	0.200 0.001*	0.727 0.503
Asthma(5)	8.61±1.94	7.25±5.36	713.06±186.29	-0.500 0.100	0.692 0.655
Rhinitis(6)	9.37±2.95	7.71±3.75	694.12±193.81	0.257 -0.200	0.817 0.696
Normal(2)	10.85±0.35	6.21±0.43	327.91±53.74	1.00 -1.00	- -

Table 5(C) Correlation between WBC, Eosinophil, Total IgE for both food & aero allergens

Conditions	WBC(A)	EOSINOPHILS(B) (%)	TOTAL IgE(C) (IU/ml)	Spearman's correlation	P - value A Vs C B Vs C
Atopic dermatitis(10)	7.91±1.44	10.78±7.5	703.19±167.05	0.406 0.200	0.537 0.588
Urticaria(9)	8.63±3.05	6.73±4.62	554.41±211.19	0.083 - 0.417	0.734 0.241
Rhinitis(7)	9.15±3.09	6.56±3.44	495.47±138.12	-0.179 0.393	0.325 0.153
Normal(6)	8.86±1.39	6.16±0.73	327.33± 38.71	0.257 0.638	940 0.374

Discussion

The global burden of atopic allergic diseases continued to increase in the past few decades especially in developing country like India.⁹ In the present investigation, we studied prevalence rates of specific IgE antibodies against aero allergens and food allergens but also analysed total IgE, eosinophils and WBC count. The normal value of total IgE is < 350 IU/ml; normal WBC count is 4.5 – 11x10⁹/l and normal eosinophils is 0-7%.

The patients chosen for this study (n=95) had the following atopic diseases: urticaria, AD, allergic rhinitis and asthma. The remaining subjects (n=45) were included as normal healthy controls with no clinical conditions. We found an increasing trend in the atopic phenotype with age when stratified by age group in south India. The positive trends are mainly to aeroallergens and are attributed to hyperreactive airways observed in children. The present findings are in accordance with the previous studies.⁹⁻¹⁴ the two phenotypes atopic

and non-atopic allergic diseases have different pathophysiological findings, and hence have different prognoses and treatment policies.¹⁰⁻¹⁵

All the patients in present study have higher than normal values for total IgE. The maximum total IgE was obtained in patients with urticaria (619.16 ± 175.85 IU/ml), followed by atopic dermatitis (563.67 ± 229.68 IU/ml). This was in contrast to the findings of Sudha S Deo et al¹⁶ where maximum total IgE was seen in asthma and allergic rhinitis.

Percentage of sensitization is slightly more in males similar to V. K. Somani et al.⁷ This may be due to outdoor activities seen in males. The same reason holds good for high incidence in patients hailing from rural areas.

IgE MEDIATED FOOD ALLERGIES

The present study recorded AD (atopic dermatitis) as major atopic disease among study population followed by urticaria. And similarly the value of specific IgE is more to food allergens than to aeroallergens. This difference could be due to changes in epidemiological factors and high incidence of parasitic infections in that area. We found that majority of the patients were from Andaman and Nicobar Islands whose main food is sea-food. Majority of foods that cause allergic reactions are cow's milk, eggs, soy, wheat and peanuts.

IgE-mediated allergic response in atopic persons develops on contact with small amounts of epitopes of offending food allergens.

We found that the prevalence rate of atopic phenotype was more in paediatric population and increased with age. The positive trends were mainly to aeroallergens and are attributed to hyperreactive airways¹⁷ observed in paediatric population. The present findings are in accordance with the previous studies.

A specific IgE testing for food allergy was done on 87 patients which includes symptomatic patients (n=50) as well as normal patients (n=37).

In the food allergens test 96% of patients showed allergy to egg yolk (EY), milk powder (MP) and coffee (CO). More than 80% of patients showed allergy to rice (R), soyabean (SO), grape (G), cucumber (CU), mustard (MU) and ginger (G). By statistical analysis, the P-value is significant for both eosinophil count and total IgE ($p < 0.001$).

In the aero allergen test 94.7% of patients showed allergy to false ragweed (FR), dog (DO), pigeon feather (PF) and jute (J). More than 80% of patients showed allergy to sunflower (SU) at (CA), trichophyton mentagrophytes (TM) and straw dust (SD).

In both food and aero allergens test 92.3% of patients showed allergy to grapes (G), Aspergillus fumigates (AF). More than 80% of patients showed allergy to cat (CA), sheep wool (SW), trichophyton mentagrophytes (TM), straw dust (SD), jute (J), eucalyptus (E), egg yolk (EY), chicken (CH), milk powder (MP), ginger (GI) and onion (O).

Significant attention is given towards the possible role of IgE in the occurrence of chronic atopic allergic disorders. The findings in present study indicated that normal levels of IgE were relatively higher than that found in other countries.

The prevalence of specific IgE to food allergens, aero allergens and both food and aero allergens were overall 67.85% (n=95/140).

The values of specific IgE in controls were within normal limits. However the prevalence of specific IgE to food allergens is more compared to other type of allergens. Our study showed higher prevalence rate to food allergens (52.63%). Maximum number of patients with food allergy had atopic urticaria and atopic dermatitis. The above findings are in contrast to the study by Shubnum Singh et al.¹⁸ New Delhi and Wiqar A Shaikh et al¹⁹ where atopic dermatitis, asthma and rhinitis were more frequent.

Among the individual conditions the patients presenting with atopic dermatitis, showed maximum value for Dermatophagoides farinae (American house dust mite) followed by cockroach, and sheep wool. Our findings are in line with V. K. Somani from Hyderabad which showed dust mite and grass pollen as most common aero allergens.⁷

Studies also intend to find a link between food allergens and environmental allergens. There exists considerable correlation among food allergen susceptibility and allergic respiratory ailments.

The WBC count among this group of people was found to be within normal limits. The eosinophil count showed higher range than normal in atopic dermatitis patients, asthma patients and rhinitis patient. Only urticaria patients were under normal limit.

The total IgE value of normal subjects should be < 350 IU/ml. The values obtained from our normal controls for aero allergen testing was 327.91 ± 57.74 IU/ml which was within the range. All the patients had higher than normal values for total IgE. The maximum value for total IgE was obtained in asthma (713.06 ± 186.29 IU/ml), followed by allergic rhinitis (694.12 ± 193.81 IU/ml) and atopic dermatitis (626.07 ± 227.78 IU/ml). In this group P-value showed no significance in any of the parameters.

The difference in specific IgE concentration studied have revealed that these allergens contain several components of which some can induce much stronger allergic reactions, than others. The higher incidence of IgE in our city could be due to higher incidence of environmental pollutants that may be allergic to atopic patients.

AERO ALLERGEN GROUP

Among the aero allergens group maximum number of patients were presented with allergic rhinitis followed by asthma. Allergic rhinitis is also found highest in Raj Kumar et al study.²⁰ The WBC count among this group was found to be within normal limits. The eosinophil count showed higher range than normal in all individual conditions except urticaria patients.

The total IgE value of normal subjects should be < 350 IU/ml. The values obtained from our normal controls for aero allergen testing was 327.91 ± 57.74 IU/ml which was within range.

All the patients had higher than normal values for total IgE. The maximum total IgE was obtained in asthma (713.06 ± 186.29 IU/ml), followed by allergic rhinitis (694.12 ± 193.81 IU/ml) then atopic dermatitis (626.07 ± 227.78 IU/ml) and urticaria (546.15 ± 195.47 IU/ml). In this group P-value showed no significance in any of the parameters.

Among the individual conditions the patients presenting with atopic dermatitis, showed maximum value for Dermatophagoides farinae (American house dust mite) followed by cockroach, and sheep wool. Our findings are in line with V. K. Somani from Hyderabad which showed dust mite and grass pollen as most common aero allergens.⁷

BOTH FOOD & AERO ALLERGEN GROUP

A specific IgE testing on patients include allergic patients as well as normal patients (n=6). Among the patients with both food and aero allergens, maximum number of patients presented with atopic dermatitis (n=10) followed by urticaria (n=9). The eosinophil count was increased in atopic dermatitis patients, whereas in rest of the conditions they were under normal limits.

Among the individual conditions, the patient presenting with atopic dermatitis showed the maximum value for crab followed by Dermatophagoides farina, peanut then house dust mite. In patients with urticaria, timothy grass showed the maximum value followed by cultivated rye. In patients with allergic rhinitis, house dust mite showed maximum value followed by prawn.

Several studies showed that the differences in specific IgE concentration is due to presence of several epitopes of which some can induce much stronger allergic reactions than others.¹⁵

Total IgE was found to be increased in food allergen group when compared to normal healthy controls (333.04 ± 39.88 IU/ml). Among all the clinical condition, only in atopic dermatitis the spearman's correlation showed significance between eosinophil value and total IgE level.

Similarly Correlation analysis among the aero allergen group, only in urticaria the spearman's correlation showed significance between eosinophil value and total IgE level.

Total IgE was also found to be increased in this group when compared to normal healthy controls (333.04±39.88IU/ml). Here there was no significance seen in all the clinical conditions with the above correlation analysis.

Conclusion

The present study suggests that it is important to study the serum IgE levels in all the allergic patients as it directly correlates with the proportion of IgE concentration in circulation. It also indirectly reflects the sensitivity of an individual towards atopy. In future quantisation of serum IgE and percentage of eosinophils along with specific IgE will be useful for better diagnosis as well as therapeutic strategy of all allergic conditions.

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