ALLERGIES IN INDIA- A STUDY OF 6270 PATIENTS

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ABSTRACT

BACKGROUND

Allergies afflict a large population of the world. Previous studies have revealed that the incidence of allergic manifestations and causative allergens in India are different from the western countries.

MATERIALS AND METHODS

6270 consecutive patients with allergic manifestations attending the clinic from July 01, 2008 to June 30, 2018 were included in this study. Patients underwent a complete allergy work-up including total serum IgE levels, skin prick tests, patch tests, pulmonary function tests and nasal function test.

RESULTS

The results obtained from this study revealed that atopy is less common in India as compared to the west. Pollen allergy and food allergy are also less common in India. Cocoa is the commonest food allergen in India and insect allergens have a high positivity rate.

CONCLUSION

Allergies in India are different from the west. We are justified in coining the term "Tropical Allergy and Asthma" as a different clinical entity when compared with allergies in western countries.

KEY WORDS

Allergy, Asthma, Atopy, Conjunctivitis, Contact Dermatitis, Eczema, Rhinitis, Urticaria

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BACKGROUND

Allergies (Atopic diseases) are the commonest of diseases afflicting mankind. There have been studies in the past which have reported the incidence of various allergies in India [1-4] and a previous study showed an incidence of approximately 29% atopy in the Indian population.[4] However, the last study is more than a decade old.[4] The present study was therefore designed to determine the current incidence of atopy, the incidence and age distribution of allergic manifestations, total serum IgE levels and the positivity rates for various allergens on skin prick testing (SPT). This study also provides an insight into the pattern of distribution of allergic diseases in the paediatric age group in India. Yet another aim of this study was to analyse the changes in the pattern of allergens and allergic diseases in India when compared with previous studies and with western countries.

MATERIALS AND METHODS

The descriptive study of 6270 consecutive patients attending the clinic from from July 01, 2008 to June 30, 2018, were included. Patients who attended the clinic for complaints other than allergies were excluded. The manifestations warranting inclusion were asthma, rhinitis, urticaria/angioedema, atopic dermatitis, contact dermatitis, allergic conjunctivitis and drug allergies.

Each Patient Underwent the Following-

1. A detailed history followed by a physical examination.
2. Estimation of total serum IgE levels using the ELISA method (normal values were 0 to 50 IU/ml). However, patients having contact dermatitis did not undergo IgE level estimation.
3. Skin prick test (SPT) using a battery of 90 common, Indian allergens.
4. Patients having contact dermatitis underwent "patch tests" with commercially available patch test allergens.
5. Patients having asthma underwent spirometry using a computerised spirometer and those with rhinitis underwent "peak nasal inspiratory flow rate" (PNIFR) using a Youlten peak nasal inspiratory flow meter. However, spirometry and PNIFR have not been analysed in this study.
6. To determine the incidence of atopy in India, 1000 random volunteers underwent SPT with 6 common allergens in India, viz. house dust mite (D. farinae), mosquito, house fly, cockroach, cat and dog. One or more positive reaction was taken as the criteria to label a volunteer as "atopic".

RESULTS

The results of this study are tabulated in Tables 1 to 9.

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Age Groups	Male		Female		Total	
Years	Number	%	Number	%	Number	%
6-12	396	11.56	174	6.12	570	9.09
13-20	444	12.96	456	16.03	900	14.35
21-30	798	23.29	690	24.26	1488	23.73
31-40	786	22.94	726	25.53	1512	24.12
41-50	528	15.41	456	16.03	984	15. 69
51-60	348	10.16	264	9.28	612	9.76
61 and Above	126	3. 67	78	2.74	204	3.25
Total	**3426**	**54.4**	**2844**	**45.36**	**6270**	**100**

Table 1. Age Group Distribution

Sex	Children	Adults	Total
Males	396 69.47 %	3030 53.16 %	3426 54.64 %
Females	174 30.53 %	2670 46.84 %	2844 45.36 %
Total	570 9.09 % of Total	5700 90.91 % of Total	6270

Table 2. Sex Distribution

No.	Categories	Children			Adults			Total		
		No. of Patients	% of Total	Mean IgE Levels IU/ml	No. of Patients	% of Total	Mean IgE Levels IU/ml	No. of Patients	% of Total	Mean IgE Levels IU/ml
1.	Asthma + Rhinitis ± Conjunctivitis	251	44%	1802	2022	35.47%	1689	2273	36.3%	1702
2.	Rhinitis ± Conjunctivitis	55	9.65%	1740	1184	20.77%	1494	1239	19.8%	1505
3.	Asthma	23	4.1%	1761	1409	24.7%	1527	1432	21.4%	1526
4.	Urticaria	67	11.7%	1259	592	10.4%	1341	659	10.5%	1333
5.	Contact Dermatitis	17	2.98%	-	175	3.07%	-	192	3.1%	-
6.	Conjunctivitis	8	1.4%	887	30	0.53%	832	38	0.61%	844
7.	Drug Allergies	22	3.86%	789	175	3.07%	762	197	3.14%	765
8.	Atopic Dermatitis	127	22.28%	1923	113	1.98%	1811	240	3.83%	1870
	Total	**570**	**9.09%**	**-**	**5700**	**90.91%**	**-**	**6270**	**100%**	**-**

Table 3. Distribution Pattern of Patients According to Their Manifestations and Their Corresponding Mean IgE Levels

No.	Allergen Groups	% Positive		
		Children	Adults	Total
1.	Pollen	6.45%	6.90%	6.82%
2.	Fungi	31.43%	32.26%	31.53%
3.	Insects	65.96%	66.82%	66.66%
4.	Dust mites	72.08%	74.15%	73.25%
5.	Dusts	48.74%	51.48%	49.11%
6.	Danders/Fabrics	35.66%	43.51%	39.56%
7.	Foods	8.98%	11.30%	9.25%

Table 4. Skin Prick Test Positive Percentage for Various Allergen Groups

Skin Prick Tests were Performed in 6078 out of 6270 Patients (5525 Adults and 553 Children)

Allergens	% Positive		
	Children	Adults	Total
A. Pollen			
1. Parthenium hysterophorus	7.69	11.52	11.17
2. Zea mays	8.42	14.08	13.56
3. Cynodon dactylon	12.10	10.98	11.09
4. Cocos nucifera	4.66	3.15	3.29
B. Fungi			
1. Cladosporium herbarum	35.49	40.21	39.78
2. Curvularia spinosus	27.33	30.92	30.59
3. Alternaria tenius	27.43	32.16	31.74
4. Aspergillus fumigatus	30.79	35.80	35.34
5. Mucor mucedo	29.44	36.13	35.52

C. Insects			
1. Moth	71.69	77.08	76.60
2. Mosquito	75.52	79.45	78.76
3. House fly	71.11	74.77	74.43
4. Cockroach	63.23	68.59	68.12
D. Dust Mites			
1. D. farinae	81.75	83.39	83.24
2. D. pteronyssinus	69.91	65.12	65.15
E. Danders			
1. Cat	62.43	69.81	69.14
2. Dog	60.61	65.27	64.84
F. Foods			
1. Cocoa / Chocolate	29.98	28.03	28.21
2. Cashew nuts	18.62	16.96	17.11
3. Coconut	15.45	19.12	18.78
4. Prawns	15.32	14.18	14.29
5. Fish	15.30	14.05	14.17
6. Crabs	15.18	14.01	14.12
7. Groundnuts	12.21	15.14	14.88
8. Mustard	10.07	16.59	16.00
9. Legumes	7.23	10.61	10.30
10. Soya bean	11.03	13.96	13.69
11. Pineapple	10.44	14.67	14.29
12. Peas	10.12	14.28	13.90
13, Rice	0.58	1.02	0.98
G. Dusts			
1. Cotton Dust	69.85	74.26	72.15
2. House Dust	60.11	66.93	62.2

Table 5. Skin Test Positivity Percentage for Some Individual Allergens

No.	Drugs	Children	Adult	Total
1.	Sulfonamides	8	20	28
2.	Penicillin	6	6	12
3.	NSAID's	18	148	166
4.	(Aspirin, Ibuprofen, Analgin, etc.) Other Drugs	4	10	14
	Total	**36**	**184**	**220**

Table 6.: Drugs Causing Allergic Reactions

No.	Manifestations	Children	Adults	Total
1.	Anaphylaxis	0	12	12
2.	Skin Rash (Urticaria, Angioedema, Fixed Drug Rash, etc.)	19	146	165
3.	Rhinitis	5	13	18
4.	Asthma	8	17	25
	Total	**32**	**188**	**220**

Table 7. Manifestations of Drug Allergies

	Allergens	Children % Positive	Adults % Positive	Total % Positive
1.	Nickel Sulphate	16.23%	45.71%	43.16%
2.	Parthenium Hysterophorus	13.5%	24.57%	22.14%

Table 8. Positive Patch Test Allergens

1. Total no. of volunteers undergoing SPT	1045
2. No. of allergens used	10
3. No. of volunteers showing one or more positive reactions to SPT	376
4. Incidence of atopy in India	35.98%

Table 9. Incidence of Atopy in Indian Population

DISCUSSION

6270 patients were included in this study, of which 570 patients (9.09%) were children (Up to 12 years of age) and 5700 patients (90.91%) were adults (Tables 1 and 2). The overwhelming ratio in favour of adults in this study is possibly because the allergy clinic is conducted by physicians (And not by paediatricians). Of the 6270 patients, 3426 (54.64%) were males and 2844 (45.36%) were females. An interesting observation in this study, is that the male: female ratio in children is approximately 2/3rd: 1/3rd, whereas it is almost 1: 1 in adults. It is therefore obvious that some male children presenting with allergic manifestations, may grow out of their allergies during their passage from childhood to adolescence and into adulthood. Several female children,

however, who were asymptomatic during childhood or may have had subclinical disease, tend to manifest allergic symptoms while entering adulthood. During, adolescence, therefore, watch out for the female child in India, because she may manifest allergic symptoms. It is also interesting to note that children manifest a combination of asthma with rhinitis more often than their adult counterparts (44%: 35%).

71.29% of patients included in this study belonged to the age group below 40 years (Table 1). This confirms that allergies affect mainly the younger population and particularly the most productive years of life, resulting in a huge loss to the society at large. 3.25% of patients were above 61 years of age, which proves that allergies are not common in the senior citizen group.

Total serum IgE levels were found to be elevated in every patient in this study, except in patients with contact dermatitis where IgE was not estimated (Table 3). IgE levels were found to be the highest in patients with atopic dermatitis, an observation that has been reported in earlier studies in India.[1-4] It is also important to emphasize that no adverse reactions (Major or minor) were encountered to SPT in any of the patients included in this study. It could therefore be concluded that SPT is an extremely safe diagnostic tool in the hands of a trained allergist.

The distribution pattern/percentage of various allergic disease remains almost unchanged in both children and adults when compared with earlier studies[1-4] (Table. 3). Undoubtedly, nasobronchial allergies viz. asthma and/or rhinitis are the commonest allergic manifestations. The incidence of atopic dermatitis is similar to that reported from western countries [5]. Also, atopic dermatitis in India is overwhelmingly common in children (22.28%) when compared to adults (3.83%), a pattern also reported from western countries.

In western studies, pollen allergens have shown a positive percentage of up to 62%.[6,7] However, the positivity rate (on SPT) for pollen in this study is 6.82%, which is in fact less than that reported in earlier studies. This suggests that pollen allergy is less common in India as compared to western countries (Table 4). Parthenium hysterophorus is one of the commonest positive pollen allergen in India (11.17%) (Table 5). This weed which is commonly known as "Congress grass" is not native to India. It was introduced into India accidentally through wheat supplies from the USA in the 1960s. Parthenium found a rather conducive, tropical environment for its growth and has, in fact, grown and spread throughout several parts of the country. Parthenium allergy is a common cause of asthma, rhinitis and airborne contact dermatitis. The last mentioned is a particularly widespread condition, presenting with a severely itchy dermatitis of exposed areas such as the face, neck, hands and feet, with especially the face presenting a ghost-like appearance. Parthenium allergy has been extensively studied in India.[8-11]

In India, the incidence of insect allergy is high with an overall positivity of 66.66%. This shows an increasing trend when compared with earlier Indian studies.[1-4] The incidence of positivity to dust mites is also higher than earlier studies (73.25%).[1-4] D. farinae is more common in India (83.24%) as compared to D. pteronyssinus (65.15%). Indeed, D. farinae has the highest positivity rate amongst all allergens commonly tested in India.

Food allergies are more common in India (9.25%) as compared to other countries (3%-7%).[12] Amongst the food allergens, cocoa now has the highest positivity rate in India (28.21%). Cashew nut, coconut, sea foods, peanut (groundnut), legumes (dals) and soya bean are the other common positive food allergens. Interestingly enough, the positivity rates for various allergen groups as well as for individual allergens were remarkably similar in both children and adults (Tables 4 and 5).

220 patients presented with drug allergies (Table 6). Of these, 206 patients reacted to the penicillin / cephalosporin group, sulphonamides and non-steroidal anti-inflammatory drugs (NSAIDs). Most drug allergies (165/200) presented with skin manifestations (urticaria, angioedema, fixed drug rash) (Table 7).

Patch test results reveal that nickel sulphate (43.16%) and Parthenium hysterophorus (22.14 %) are the commonest culprit allergens (Table 8). Females wearing artificial jewellery and coin handlers have been found to have contact dermatitis to nickel.

The incidence of atopy in other countries has been found to be approximately 40%.[13,14] The present study concludes that the incidence of atopy in India is 35.98%. When compared with earlier studies,[1-4] there has been a definite increase in the incidence of atopy in India from 25.3% in 1977 to 28.96% in 2007 / 2008 to 35.98% in the present study.

A recently published study[15] has concluded that in India, allergies are heredofamilial diseases wherein son inherits the disease from the father and daughter from the mother.

There is enough evidence in this study to conclude that the pattern of allergic diseases in both children and adults and the allergens commonly seen in tropical India are different from those seen in the west. We are thus justified in coining the term "Tropical Allergy and Asthma" as a new subspecialty of allergy.[16,17]

CONCLUSION

1. Atopy is less common in India as compared to the western countries.
2. When compared with previous studies, the distribution pattern of various allergic disorders remains virtually unchanged in both children and adults.
3. In children, the male: female ratio is 2/3:1/3, whereas in adults it is almost 1:1. Indian females are therefore, more likely to grow into allergies as compared to their male counterparts, while growing out of childhood.
4. Pollen allergy is much less common in India as compared to western countries.
5. Food allergy is more common in India as compared to western countries.
6. The house dust mite D. farinae, has the highest positivity rate amongst all allergens in India.
7. There is a quantum increase in the incidence of allergy to cocoa and this is now the commonest food allergen in India.
8. More than two thirds of allergy sufferers in India are positive to insects (mosquito, house fly, cockroach, moth).
9. NSAIDs are the commonest cause of drug allergies in India and are responsible for more than 75% of all drug reactions. Again, more than 75% of drug reactions

present with dermal manifestations (urticaria, angioedema, fixed drug reactions).

10. Allergies in India are different from the west. We are justified in coining the term "Tropical Allergy and Asthma" as a different clinical entity when compared with allergies in western countries.

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