

Allergen sensitizations in patients with allergic rhinitis in Jammu region

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Abstract

Background: There are various allergens to which patients with allergic rhinitis can be sensitized to. To adequately treat allergic rhinitis patient we need to identify the specific allergens to which the patient is allergic to, so that appropriate treatment can be planned. **Aim:** to identify the causative allergen in patients with allergic rhinitis in our region. **Materials and Methods:** the study was conducted in the allergy and immunology clinic, Jammu on patients attending our clinic with history and clinical examination suggestive of allergic rhinitis for the duration of 18 months from June 2017 till November 2018. Every patient tested was counselled regarding the skin prick test and allergic rhinitis. Standardized allergen extracts were used for testing patients. Test was then conducted if histamine wheal size was 3mm above the saline wheal size. Small drop of each allergen was then placed 2 cm apart and using 1mm lancet the allergen was introduced in the skin by pricking. **Results:** A total of 374 patients were tested by skin prick test. Out of which 227 males and 157 females were tested. Most of the patients tested were in the age group of 20-40years. In our study the distribution of skin prick test was found to be dust mite in 77.14%, pollens in 50.28%, insects in 14%, moulds in 9.14%, food allergens in 3.43% and animal dander (cow epithelia) in 0.99%. **Conclusion:** regional differences are seen in distribution of causative allergen for allergic rhinitis. Dust mite sensitivity in our region is explained by the climatic conditions favouring use of carpets and room heaters in our region.

Key Word: allergic rhinitis.

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INTRODUCTION

The concept of allergy was given by Viennese paediatrician Clemens Von Pirquet in 1906¹. A major breakthrough came with the discovery of IgE antibody by kimishige and Ishizaka and coworkers. Word allergy is now restricted to type 1 hypersensitivity reactions which

are IgE mediated. Allergic rhinitis is a hyper response i.e hyperactivity of immune system to otherwise innocuous particles creating an inflammatory response. The Allergic Rhinitis and its Impact on Asthma (ARIA) 2008 updated document defined allergic rhinitis as a symptomatic disorder of the nose, induced after allergen exposure by an immunoglobulin E inflammation and it estimates that there are 500 million subjects in this world who suffer with allergic rhinitis (AR).² Allergic rhinitis is also known as hay fever and it causes significant impact on the quality of life of a person. To diagnose allergic rhinitis patient's history with clinical symptoms such as sneezing, rhinorrhea, postnasal drip, itchy nose and nasal congestion when there are no signs of lower respiratory tract infections and clinical examination are suggestive of allergy, with positive skin prick test and IgE specific antibody present to the sensitized allergen.³ There are various allergens to which patients with allergic rhinitis

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can be sensitized to. These include pollen, fungal spores, insect debris, house dust mites, animal dander and food allergens. To adequately treat allergic rhinitis patient we need to identify the various allergens to which the patient is allergic to, so that appropriate preventive measures can be explained to the patient and specific immunotherapy can be started.^{4,5} With the aim to identify the causative allergen in patients with allergic rhinitis in our region the following study was carried out.

MATERIALS AND METHODS

The study was conducted in the allergy and immunology clinic, Jammu on patients attending our clinic with history and clinical examination suggestive of allergic rhinitis for a period of 18 months from June 2017 till November 2018. Patients with history of anaphylaxis, severe dermatographism, pregnancy and active dermatological condition were excluded from the study. All the patients were subjected to detailed history and clinical examination. All patients underwent few hematological investigations like total serum IgE test and differential and total leukocyte count. The patients were asked to stop taking anti-histaminic medication at least 5 days before and oral sympathomimetic at least 12hours before

undergoing skin prick test. Every patient tested was counselled regarding the skin prick test and allergic rhinitis. Standardized allergen extracts were used for testing patients. For skin prick testing of the patient, proper consent was taken and test was conducted on the volar aspect of the forearm. Before testing for the allergens, buffer saline and histamine acid phosphate (1mg/ml) was tested using 1mm lancet and labelled as negative and positive control respectively and the wheal formed after 8 minutes was seen and its size measured in horizontal and vertical plane and recorded. Test was then conducted if histamine wheal size was 3mm above the saline wheal size. Small drop of each allergen was then placed 2 cm apart and using 1mm lancet the allergen was introduced in the skin by pricking. After waiting for 15 minutes the wheal and flare reaction was looked for. The allergen was considered positive only if the wheal size formed was 3mm above than that of the negative control. The positive reactions were then correlated with the history of the patients and cross reactivity ruled out and finally patient was informed about the clinically relevant allergen. Wherever relevant avoidance measures were explained to the patients.

RESULTS

A total of 374 patients were tested by skin prick test. Out of which 227 males and 157 females were tested. Most of the patients tested were in the age group of 20-40years.

Age groups(yrs)	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
UPTO 10	12	3.2%	3	0.8%	15	4.01%
10-19	30	8.02%	2	0.53%	32	8.56%
20-29	84	22.45%	54	14.44%	138	36.90%
30-39	58	15.5%	46	12.29%	104	27.8%
40-49	24	6.42%	39	10.43%	63	16.85%
50-59	18	4.81%	3	0.8%	21	5.61%
>60	1	0.27%	0		1	0.27%
TOTAL	227	60.70%	147	39.30%	374	100%

In our study the distribution of skin prick test (TABLE 2) was found to be dust mite in 77.14%, pollens in 50.28%, insects in 14%, moulds in 9.14%, food allergens in 3.43% and animal dander (cow epithelia) in 0.99%.

S No.	Allergen	Total Postives
1	Dust mites	270(77.14%)
2	Pollen	176(50.28%)
3	Insects	49(14%)
4	Moulds	32(9.14%)
5	Food	12(3.43%)
6	Animal epithelia	2(0.99%)

Amongst Dust Mites, Dermatophagoides Pteronyssinus was seen in 71.48% of the patients with dust mite positivity and Dermatophagoides Farinae was seen positive in 58.14% of the patients. Acrussiro was positive in 41.48%, lepidoglyphus Destructor was seen in 34.07% and Tyrophagus Putrescentiae was seen in 34.81%.

S No	Dust mites and storage mites	Percentage
1	Mite d farinae	157(58.14%)
2	Mite d pteronyssius	193(71.48%)
3	Acrus siro	112(41.48%)
4	Lepidoglyphus destructor	92(34.07%)
5	Tyrophagus putrescentiae	94((34.81%)

Most of the patients tested were polysensitized and had multiple pollen allergies, amongst the pollen allergen tested around 73.30% patients with pollen allergies in our study were positive to Ageratum Conyzoides weed plantation. Other weeds which were seen positive in our patients was amaranthus spinosus seen in 32.95%, parthenium in 23.86%, Ricinus Communis in 11.96%, Mugwort(Artemis Vulgaris) in 26.70%, Dandelion in 2.59%, Lamb Quarters 20.46% and Xanthium Strumarium in 23.29%. amongst the grasses tested Bermuda grass was positive in 26.14%, Rye grass in 5.11%, wheat in 3.41%, oat in 2.27% and Meadow Fescue in 11.96%. Amongst Tree pollens Prosopis juliflora was seen positive in 43.18%, Putranjiva Roxburghii in 22.16%, Cassia Occidentalis in 10.23%, birch in 4.55%.

Sno	Pollen	Percentage
1	CYNODON DACTYLON (BERMUDA GRASS)	46(26.14%)
2	AGERATUM CONYZOIDES	129(73.30%)
3	AMARATHUS SPINOSUS	58(32.95%)
4	PARTHENIUM	42(23.86%)
5	PROSOPIS JULIFORA	76(43.18%)
6	PUTRANJIVA ROXBURGHII	39(22.16%)
7	LAMB QUARTERS (CHENOPODIUM)	36(20.46%)
8	RYE GRASS	9(5.11%)
9	TIMOTHY GRASS	36(20.46%)
10	RICINUS COMMUNIS	21(11.96%)
11	CASSIA OCCIDENTALIS	18(10.23%)
12	MUGWORT	47(26.70%)
13	NETTLE	14(7.95%)
14	BIRCH	8(4.55%)
15	WHEAT	6(3.41%)
16	OAT	4(2.27%)
17	DANDELION	38(21.59%)
18	RYE	8(4.55%)
19	ASH	2(1.14%)
20	MEADOW FESCUE	21(11.96%)
21.	XANTHIUM STRUMARIUM	41(23.29%)

The fungal allergens tested included Aspergillus Fumigatus which was seen in 87.5% of patients who tested positive for moulds and Cladosporium was seen in 5 patients. Rest no other fungal allergen was positive in our study.

Sr.no	Fungal spores	Percentage
1	ASPERGILLUS FUMIGATUS	28 (87.5%)
2	CLADOSPORIUM	5(15.63%)
3	HELMINTHOSPORIUM HALODES	NIL
4	SERPULA LACRYMANS	NIL
5	PULLULARIA PULLMANS	NIL
6.	FUSARIUM MONILIFORME	NIL

We tested 8 food allergens in patients and amongst these 7 patients tested positive to Hens Egg and 3 patients tested positive to Wheat Flour, these patients gave history of gastrointestinal upset following intake of certain processed wheat flour items and we suspect gluten allergies in these 3 patients. 2 patients came positive to Cow's milk and both of them aged 4 and 5 years respectively were referred by paediatrician who suspected milk allergy because of poor growth and gastrointestinal upset following intake of milk products.

Sno	Food allergen	Percentage
1	COWS MILK	2
2	HENS EGG	7
3	WHEAT FLOUR	3
4	PEANUT	0

5	CORN FLOUR	0
6.	CHICKEN	0
7.	MUTTON	0
8.	BEEF	0

DISCUSSION

The study include a total of 374 patients and out of which 350 patients tested positive to the skin prick test. Most of the patients in our study were in the age group of 20-40years. In our study 93.58% patients tested positive to some allergen by SPT. In a similar study by Jain S *et al*⁶ 95% patients with allergic Rhinitis had positive Skin Prick Test. In a study conducted by Shyna KP *et al*⁷ out of 60 children aged below 15years, forty two patients (70%) tested positive for SPT and 18 (30%) were negative. Our study had 60.70% males and 39.30% females. In a study by Sheikh S *et al*⁸ on school children on allergic rhinitis 56% were males and 44% were females. In another study conducted in kerala by Shyna KP *et al*⁷ on children 60% boys were included in the study and 40% females. In another study by Dey S and Chakraborty T⁹, the total number of cases included in the study was 106 (70 males and 36 females). In our study the distribution of skin prick test was found to be dust mite in 77.14%, pollens in 50.28%, insects in 14%, moulds in 9.14%, food allergens in 3.43% and animal dander (cow epithelia) in 0.99%. In a study by Sheikh S *et al*⁸, the distribution of skin prick test was found to be dust mite in 77.58%, pollen in 68.96%, moulds in 13.79%, only dust mite in 25%, only pollen in 17.24%, only mould in 8.62%, dust mite + pollen in 43.10%, dust mite +moulds in 6.03% and dust mite + pollen + moulds in 3.44%. In study by Jain S *et al*⁶ in subjects with AR, SPT was majorly positive for pollens (78.5%) followed by insects (64.5%), food (50%), dust (38.5%), dander (21%), dust mites (18%) and fabric (5%). According to the insect panel testing, allergy to female cockroach (35.5%) was the most frequent. Among food allergens, milk (5%) was the most common trigger. In study by Shyna *et al*⁷, they had tested seven common allergens and house dust mite allergen yielded the highest number of positive responses (33%) followed by cockroach (25%), alternaria (16.66%), parthenium (10%), cat dander (8.35%), sorghum (5%) and dog dander (5%). In another study by Dey and Chakraborty⁹ in patients with allergic asthma, the highest positivity for inhalant allergens was seen for house dust mite (50.94%) followed by male cockroach (39.62%), whereas among food allergens, the highest positivity was seen for egg/egg products (31.13%) followed by milk/milk products (30.19%). Study of inhalant allergens in coexistent asthma and AR patients revealed the highest positivity for house dust mite (58.73%) followed by cockroach male (42.86%), whereas study of food allergens in these patients showed the

highest positivity for milk/milk products (34.92%) followed by egg/egg products (33.33%). In another study done in Central India (Nagpur), the most common allergens were mite (49%), followed by pollen (21.8%), dust (15.4%), insect (10.6%), fungus (3%), and animal epithelia (0) in AR patients. Partheniumhysterophorus (7.7%) was the most common pollen found¹⁰. According to a study including AR patients across India, insects (39.17%) were the most common aeroallergens followed by various types of house dust mites (11.99%), weed pollens (11.61%), dust(10.51), fungal spores (6.17%), tree pollen (6.12%), grass pollens (4.8%), kapok cotton (2.23%), silk (1.97%), and wool (0.42%) were the offending allergens¹¹. Sensitisation pattern to various aero-allergens by skin prick test in patients of united airway disease in Bhopal, demonstrated pollen as a dominant allergen followed by fungi, insects, dust, dander, fabric and feathers¹². In our study Dermatophagoides Pteronyssinus was most common dust mite seen followed by ermatophagoides Farinae. In a study by Arbat *et al* Dermatophagoides pteronyssinus (56.6%) was the most common causing symptoms as was seen in our study. Dermatophagoides farinae (49%) and Blomia species (50.4%) were the other two types of mites¹⁰. Gill NK *et al.*, in their study found D. farinae (52.12%) to be the most significant dust mite¹³. In another study by Jain S *et al* Dermatophagoides farinae was the common dust mite seen⁶. In our study amongst pollens, Ageratum Conyzoides, Prosopis Juliflora, Amaranthus Spinosus, Cynodon Dactylon and Mugwort (Artemesia Vulgaris) were most common pollen seen positive in our patients. In another study done by Dave L and Srivastava, the three dominant pollen allergens were Cynodondactylon (53.93%), Cenchrusciliaris (47.19%) and Carica papaya (40.44%)¹². In a study by Gill Nk *et al*, the overall incidence of skin reactivity was seen highest against the pollen allergen belonging to the family Asteraceae and Moraceae¹³. In study by Jain S *et al*, SPT reactivity was seen highest for the pollen of ProsopisJuliflora⁶. Singh AB *et al.*, also observed Prosopisjuliflora as a major cause of pollinosis with 12% patients from Delhi showing a positive skin reaction¹⁴. In the study by Rao M *et al*, Partheniumhysterophorus pollen extracts showed highest positivity in 34% of allergic rhinitis patients¹⁵. In study by Agashe and Soucenadinin patients in Bangalore the highest skin reactivity was seen to Casuarina equisetifolia¹⁶. Few other clinically relevant aeroallergens reported from Andra Pradesh and Bangalore include Cassia, Ageratum,

Salvadora, Ricinus, Albizialebeck and Artemisia scoparia^{17,18}. Cockroach allergen is widely known as a source of inhalant allergen in patients with Allergic Rhinitis, which was also seen positive in our study in 14% patients. Kumar *et al.* Reported that cockroach (85%) is an important aeroallergen and is widely implicated in patients with allergic rhinitis in India²⁰, Food allergy is estimated to be around 4.5% in patients with Allergic Rhinitis and in our study 3.43% patients had sensitization to food allergens. In another study by Jain S *et al* 50% of patients tested positive to food allergens⁶. In study by Kumar *et al.*, allergic reactions were frequently reported after consumption of curd in 48.1%, rice in 43.9%, citrus fruits in 35.2%, banana in 27.0%, milk in 11.9% and black gram in 9.7% cases of patients from Delhi²⁰. However in our study, Hen Egg was the most significant food trigger in patients with Allergic Rhinitis. In a study by Prasad *et al* animal dander (3.1%) was seen as major allergens in patients of naso-bronchial allergy; among animal dander common offending allergens were cow dander (4.16%) and dog dander (4.16%)²¹. In our study cow dander was only seen in two patients. In study by Dev L and Srivastava Cat dander (19.10%) and dog dander (19.10%) were most common sensitizers in patients¹². However, according to Arbat *et al.*, none of AR patients from Nagpur showed positive reaction to animal epithelia¹⁰. Similarly, Rasool *et al.* did not notice any positive results in skin prick test for dog epithelia in AR patients from Kashmir²². In another study by Jain S, human dander (6.5%) caused positive allergen test reaction.

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