

## Allergic Rhinitis Pattern of Allergen Sensitivity

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### ABSTRACT

**Aim:** To analyze and quantify the allergen sensitivity pattern in local population suffering from allergic rhinitis.

**Type of study:** It is a simple observational study.

**Place and duration of study:** Patients of allergic rhinitis reporting to ENT department of Avicenna Hospital from 18<sup>th</sup> April 2012 and 20<sup>th</sup> September 2014

**Sampling technique:** Simple non-probability random sampling.

**Method:** A total of 265 patients were included in the study. Skin prick test was carried out in all the patients with 17 common allergens using Hollister Stier Laboratories prick test allergens. Positive and negative controls were also tested in all patients.

**Results:** Maximum patients showed sensitivity to the insect group that included allergy to cockroach (66.4%) followed by house dust mite (50.9%). Pollen group followed insect group and included grasses (20%) and tree mix (15.84%). Other groups tested were fungus group including aspergillus (13.58%), Candida (12.45%) and Alternaria (7.16%), animal group including cat (8.67%) and dog (4.91%) and eatables group (Egg, chicken, peanut, fish beef and milk). Mean age group of allergic rhinitis patients was 26 years with male to female ration being 2.6:1.

**Conclusion:** Symptoms of allergic rhinitis can be reduced by avoiding exposure to cockroaches, house dust, grasses, tree mix and fungi, as they are the most common allergens encountered in our setup. Their extract must be a part of allergy kit used for allergy testing for allergic rhinitis.

**Keywords:** Allergic Rhinitis, Skin prick test, Cockroach sensitivity.

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### INTRODUCTION

Allergic Rhinitis is fairly common in our setup. The level of pollution in our rural areas and cities may be much greater than that in the developed world. This simple observational study was thus carried out to assess the allergen sensitivity pattern in our setup. Hollister Stier Laboratories prick test allergens [fig 1] ([www.biodiagnosics.co.uk](http://www.biodiagnosics.co.uk)) were used in all patients. All patients were tested for 17 common allergens selected carefully from a long list. Two additional pricks of positive and negative control were also made. The selection of all allergens was made keeping in view our environments and allergic pattern.

### MATERIAL AND METHOD

Patients of allergic rhinitis reporting to Avicenna Hospital. Convenient non-probability random sampling was done to select the patients. A total of 265 patients were selected for the study.

#### Exclusion Criteria:

- Patients with known history of severe hypersensitivity reactions.

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- Patients with Dermographism i.e., A non-specific reaction to trauma in which case the individual develops erythematous rash even to normal saline used as negative control.

**Technique:** 10 allergens (Including positive & negative controls and 8 allergens) were tested on ventral aspect of left forearm while another 9 allergens were tested on ventral aspect of right forearm (table 1). A drop of each allergen was placed corresponding to the number marked by pen (fig 2). A steel lancet (with 1m.m. tip and shoulders to prevent excess penetration) was then used to penetrate through each drop into the epidermis for one second. Inside the epidermis, the tip of lancet was gently elevated to lift the epidermal layer without causing bleeding (fig 3). Each prick was observed for wheal and flare reaction after 15 minutes. To obtain a permanent record, the wheal was encircled with a fine tip pen (fig 4) and the drawing was then transferred to a sheet by means of a translucent tape (fig 5). The largest diameter of wheal and the diameter perpendicular to it were then measured and a mean diameter was then calculated. A wheal of the size larger than half that for positive control was taken as significant, and the individual was considered as having allergy to it.

## RESULTS

The allergic pattern observed in 265 patients has been summarized in Table I.

The group wise sensitivity pattern is as below:

Insect Group	-	311
Pollen Group	-	95
Fungus Group	-	88
Animal Group	-	57
Eatables	-	43

Note: The sum of sensitivities to individual allergen may exceed the total number of patients tested because many test subjects were allergic to multiple allergens tested. Percentage of group wise occurrence of allergy in our study is shown in fig 5. It

Fig 1: Hollister Stierr Laboratories prick test allergens



Fig 2: drop of each allergen placed on ventral aspect of both forearms.



can be seen that the highest number of allergic response was seen in the insect group that included allergy to cockroach followed by house dust mite. Insect group was followed by pollen group (Grasses and tree mix), fungus (Aspergillus, Candida and Alternaria), animals (Cat and dog) and eatables in order of frequency. Age wise summary is shown in fig 6. The peak age group for allergy lies between 10-40 years with mean age being 26 years and standard deviation 11.25 years (Median – 26 years, Mode – 32.6 years). Out of 265 patients in the study there were 192 males and 73 females making the male to female ratio of 2.6: 1. Group wise incidence allergy prevalence in males and females is shown in table 1

Fig 3: Steel lancet with 1m.m. tip and shoulders penetrates through each drop into the epidermis.

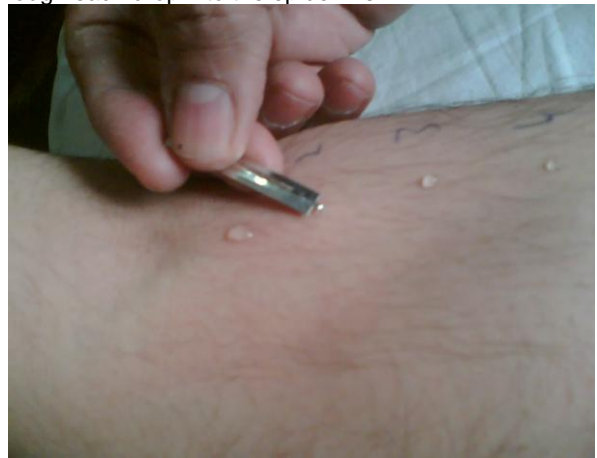


Fig 4: Allergic wheal over the forearm encircled with a fine tip pen.



Fig. 5: Group wise distribution of allergic pattern

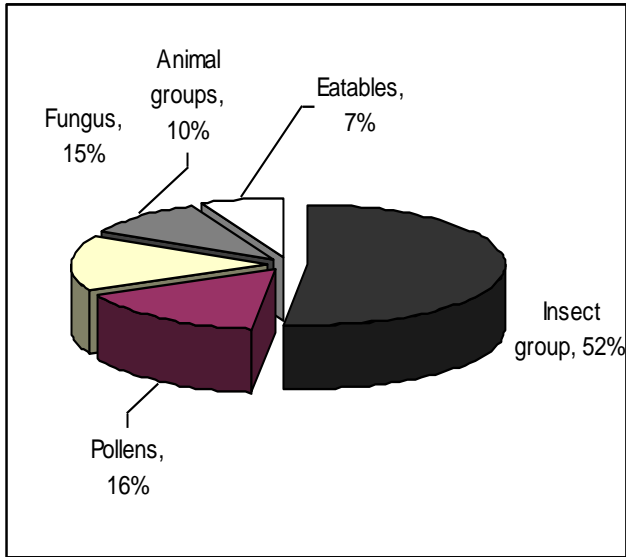
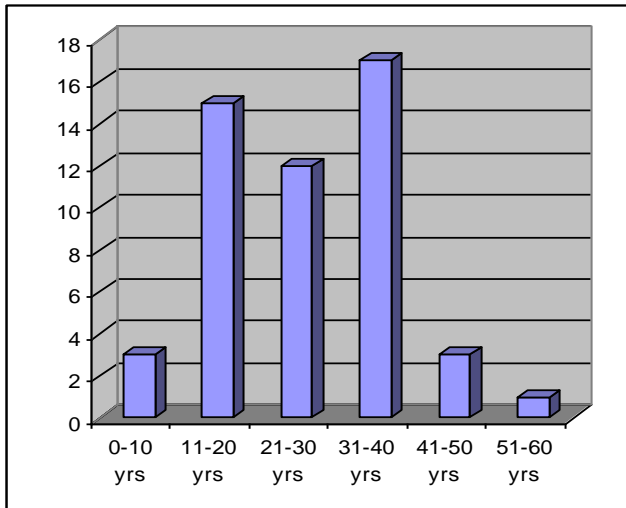


Fig.6: Age wise distribution of allergic rhinitis patients



## DISCUSSION

Skin prick test is perhaps the most commonly used test to demonstrate atopy to various allergens. It is reliable and highly reproducible<sup>1</sup>. In our study highest number of patients had allergy to cockroaches. This may be a surprise for the clinicians as well as the patients who generally assume house dust mite to be the commonest allergen. However if this data is compared to the most studies available, it seems to be in line with the common prevailing trends around the world. In most of the similar studies carried across the world, high frequency of cockroach sensitivity was seen in all studies in which cockroach antigen was part of the allergy testing kit used. Considering the absence of a visual presence of cockroaches in the indoor environments of our

cockroach-sensitive patients, it was suggested that there was a possibility of unrecognized exposure to cockroach materials. One study suggested the possibility of carrying cockroach allergens from infested places on clothing. Study show cockroach sensitization is common among children with respiratory allergies irrespective of infestation history, suggesting that addition of cockroach allergen to the routine allergy-screening panel is critical<sup>3</sup>. Sastre and Ibanez studied a series of 172 cases. A total of 153(90.5%) subjects were atopic and 19 (10%) were considered nonallergic. Pollen sensitivity (66.5%) was most prevalent, distantly followed by sensitivity to cockroach (25.7%), mite (20%), cat (15.5%), *Alternaria alternata* (14.5%), dog (14%), and food (2%). Skin test reactivity to cockroach extracts was 37(21.6%) to B.o., 20 (11.6%) to P.a., 19(11.1%) to B.g. and five (2.9%) to FEB.g<sup>4</sup>. Sattar and Mobayed studied a series of 1106 patients in Qatar for common allergens in which the blood sample was taken for measuring specific IgE concentration. Males had higher prevalence of allergic rhinitis (86.0%) than females. The most common allergens detected in order of frequency were *Dermatophagoides Pteronyssimus* (Der p I) in 248 patients (41.6%), *Dermatophagoides Farinae* (Der f I) in 220 patients (36.9%), Cockroach allergen (Bla g I) in 192 patients (32.2%). The study showed that females are more exposed to pollen, grasses and tress, but males are mostly exposed to mites and insects<sup>5</sup>. Huss and Adkinson studied the determinants of sensitization for dust mite and cockroach allergen. They found that the levels of exposure determined by house dust analysis are important determinants of sensitization for dust mite and cockroach allergen. This relationship was not demonstrable for cat, dog, or mold allergens, possibly because of confounding factors. For all allergens studied, the degree of atopy, determined by the total number of positive skin test responses or by total serum IgE levels, is an important contributing risk factor for sensitization<sup>6</sup>.

Kang and Sulit performed allergy skin tests with cockroach antigen along with various common inhalant allergens on 222 atopic and on 63 non-atopic subjects. The most prevalent allergen producing a positive skin test was house dust antigen with a positive response of 72%, 78% and 57% in atopic adults, atopic children and non-atopic children, respectively. The next prevalent positive skin test was to cockroach antigen with 50%, 60% and 27%, respectively, of the three groups tested. The differences between positive cockroach hypersensitivity and house dust hypersensitivity in all three groups tested were statistically significant. Next in order of prevalence of positive skin test to common inhalants were western weeds, ragweeds and cats.

Incidence of cockroach hypersensitivity was 58% among asthmatic adults and 69% among asthmatic children. The results indicate that cockroach hypersensitivity is highly prevalent and that cockroach antigen is an independent agent from house dust as a cause of immediate hypersensitivity reaction<sup>7</sup>. A local study conducted at Rawalpindi showed highest frequency of allergic response to house dust (72.6%) followed by house dust mite (64%), mixed pollens (59.5%), paper mulberry (21.5%), cannabis (13.5%) and moulds (20%). Skin prick test was employed to test sensitivity to allergen. However sensitivity to cockroach and several other important allergens were not tested. Leaving aside the allergens not tested in this study, the results are in line with the results of our study. It is thus suggested that cockroach must be included in any allergy study conducted in our country<sup>8</sup>.

## CONCLUSION

Sensitivity to cockroach is fairly common in Pakistani population suffering from allergic rhinitis, therefore cockroach antigen should be an essential part of all allergy-testing procedures. Other common allergens include house dust mite, grasses, tree mix and fungi. Allergic tendencies are commoner among males compared to females and mean age group is 26 years. Symptoms of allergic rhinitis can be reduced by avoiding exposure to cockroaches, house dust, grasses, tree mix and fungi, as they are the most

common allergens encountered in our setup. Their extract must also be a part of allergy testing kit used for allergy testing kit in all allergic rhinitis patients.

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Table I: Sensitivity to various allergens as seen in our study (n=265)

Sr. No.	Allergen	Sensitivity	%	Male	Female	Ratio
				-	-	
2	Histamine (positive control)	262	98.86	-	-	
3	Cockroach	176	66.42	145	31	4.7 : 1
4	House Dust Mite	135	50.94	104	31	3.4 : 1
5	Grasses	53	20.00	41	12	3.4 : 1
6	Tree Mix	42	15.84	35	7	5 : 1
7	Aspergillus	36	13.58	25	11	2.3 : 1
8	Candida	33	12.45	30	03	10 : 1
9	Cat	23	08.67	19	04	4.7 : 1
10	Budgerigar	21	07.93	18	05	3.6 : 1
11	Alternaria	19	07.16	12	07	1.7 : 1
12	Dog	13	04.91	11	02	5.5 : 1
13	Egg	10	03.77	05	05	1 : 1
14	Chicken	08	03.02	07	01	7 : 1
15	Peanut	07	02.64	06	01	6 : 1
16	Fish	07	02.64	05	02	2.5 : 1
17	Wool	05	01.89	03	02	1.5 : 1
18	Beef	03	01.13	01	01	1 : 1
19	Milk	03	01.13	01	02	1 : 2

(As many test subjects were allergic to multiple allergens tested, therefore the sum of sensitivities to individual allergen may exceed the total number of patients tested.)