

## A Comparison of Skin Test Reactions in Patients with Allergic and Vasomotor Rhinitis

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**Background:** Allergic and vasomotor rhinitis are the most common forms of noninfectious rhinitis with similar signs and symptoms. Various environmental allergens have been held responsible for allergic type of rhinitis.

**Objective:** To find out the common environmental allergens responsible for sensitivity in patients with allergic rhinitis and compare the findings in vasomotor rhinitis patients.

**Material and Methods:** Ninety subjects were selected for the study. Out of these, 30 were patients with allergic rhinitis, 30 were patients with vasomotor rhinitis and 30 were healthy subjects as control. Patients were labeled as allergic rhinitis on the basis of eosinophils in nasal smears. Sensitivity to common environmental allergens was determined by skin prick test using Ben Card allergy test kit, strictly following manufacturer's instructions.

**Results:** Common environmental allergens responsible for sensitivity in allergic rhinitis patients were house dust (86.6%), house dust mites (70%), mixed thrashings (80%), straw dust (56.6%), hay dust (66.6%), mixed feathers (43.3%), cat fur (53.3%), cotton flock (50%), tree pollen (40%) and grass pollen (43.3%). Sensitivity to these allergens was observed in significantly less ( $p < 0.01$ ) percentage of vasomotor rhinitis and control group. Sensitivity to house dust, house dust mites and cat fur was of severe degree in majority of allergic rhinitis patients, while sensitivity to mixed thrashings, straw dust, hay dust and mixed feathers was of moderate to severe degree in majority of these patients.

**Conclusion:** Skin prick tests provide an effective method to find out sensitivity to different allergens in cases with allergic rhinitis to differentiate these from patients with vasomotor rhinitis. Based on these findings the physicians can manage the patients in a better way.

**Keywords:** Allergic Rhinitis, Vasomotor Rhinitis, Skin Test Reaction.

### Introduction

Rhinorrhoea disrupts the quality of life of a large segment of population. The most common non-infective inflammatory state associated with rhinorrhoea is allergic rhinitis.<sup>1</sup> Non-infectious rhinorrhoea also results from autonomic abnormalities. This is labeled as vasomotor rhinitis.<sup>2</sup> Allergens from various sources are responsible for causing allergic rhinitis. Identification of allergens responsible for rhinitis may help in effective treatment of this problem. Skin prick tests can be used to detect IgE sensitivity to the various suspected allergens.<sup>3</sup> This study was carried out to find out the sensitivity pattern of common environmental allergens in our allergic and vasomotor rhinitis patient population.

### Material and Methods

Ninety subjects were selected for the present study. They were divided into patients group and control group. Patients group comprised of sixty patients suffering from rhinitis. They were taken from ENT

out patients departments of different teaching hospitals of Lahore.

Out of these, thirty subjects were suffering from allergic rhinitis while thirty subjects were suffering from non-purulent vasomotor rhinitis. Patients were labeled as allergic or non-allergic on the basis of clinical history and presence of eosinophils in the nasal smears (subjects with one or more eosinophils per oil immersion field of giemsa stained smears made from nasal secretions of patients were considered to be suffering from allergic rhinitis).

These patients had symptoms of sneezing, nasal itching, watery nasal discharge, nasal congestion etc. Also these patients were not suffering from asthma or eczema clinically. Thirty healthy control subjects with matching age, sex and socioeconomic status were also studied.

These subjects were apparently healthy, free from nasal symptoms. All the subjects had not used any antihistaminic drugs for at least last three days. All the subjects were explained about the test and verbal consent was obtained.

## Allergy Skin Prick Test

In this study, allergen extracts of commonly found allergens in the environment manufactured by Ben card, England were used. These included house dust, house dust mites, straw dust, hay dust, mixed thrashings, moulds, feathers mix, kapok, cat fur, cotton flock and pollens from trees/grasses.

The allergy test was performed on the volar aspect of the forearms of the subjects. Before test, they were asked to clean the forearm with soap and water. A drop of all the allergens was placed on the skin. This material was inoculated into the superficial layer of the skin through a gentle prick by lifting the skin with the tip of a disposable lancet. A negative saline and a positive histamine control was also applied and pricked similarly as the allergen extracts. At least 3cm distance was kept between the two allergens. Skin reaction was noted after 15 minutes. Development of redness and wheal at the site of prick constituted a positive reaction which was measured as the diameter of wheal with erythema. The reactions were designated as mild (wheal with erythema up to 5mm diameter), moderate (wheal with erythema between 5-8mm) and severe (wheal with erythema more than 8mm).

Statistical analysis of results was carried out using chi-square test.

## Results

The mean age of the control subjects was 30 years with a range of 10-65 years. Mean age of allergic rhinitis patients was 33 years with a range of 6-72 years. The mean age of vasomotor rhinitis patients

was 33 years with a range of 7-70 years. In control group, 18 were males and 12 were females. In allergic rhinitis patients, 21 were males and 9 were females. Similarly in vasomotor rhinitis patients, 21 were males and 9 were females.

Common environmental allergens responsible for sensitivity in allergic rhinitis patients were house dust (86.6%), house dust mites (70%), mixed thrashings (80%), straw dust (56.3%), hay dust (66.6%), mixed feathers (43.3%), cat fur (53.35), cotton flock (50%), tree pollens (40%) and grass pollens (43.3%). In comparison to allergic rhinitis group, sensitivity to all the above allergens was observed in significantly less percentage ( $p < 0.001$ ) of vasomotor rhinitis and control groups (**Table 1**).

It was also observed that majority of the allergic rhinitis patients showing sensitivity to house dust, house dust mites and cat fur had severe degree of sensitivity, while sensitivity to mixed thrashings, straw dust, hay dust and mixed feathers was observed to be of moderate to severe degree. For other allergens, sensitivity was observed to be of mild to moderate degree. (**Table 2**)

## Discussion

Allergy is undoubtedly a common cause of rhinitis. Therefore, many practitioners regard all forms of rhinitis as being of allergic etiology.<sup>4</sup> Clinical manifestations of allergic rhinitis are the results of an immune mediated process after exposure of a sensitized-individual to air borne allergens. In this process, there is interaction of immunoglobulin E

**Table-1:** Sensitivities to common environmental allergens in allergic rhinitis, vasomotor rhinitis and control groups.

Names of Allergens	Name and percentages of sensitive subjects		
	Allergic Rhinitis (n=30)*	Vasomotor rhinitis (n=30)**	Control (n=30)***
House dust	26 (86.6)	1 (3.03)	0 (0.0)
House dust mites	21 (70.0)	4 (13.3)	1 (3.3)
Mixed thrashings	24 (80.0)	5 (16.6)	1 (3.3)
Straw dust	17 (56.6)	1 (3.03)	1 (3.3)
Hay dust	20 (66.6)	3 (10.0)	1 (3.3)
Mixed feathers	13 (43.3)	2 (6.06)	0 (0.0)
Cat Fur	16 (53.3)	4 (13.3)	1 (3.3)
Cotton Flock	15 (50.0)	1 (3.03)	0 (0.0)
Kapok	08 (26.6)	2 (6.06)	1 (3.3)
Tree pollens	12 (40.0)	4 (13.3)	0 (0.0)
Grass pollens	13 (43.0)	4 (13.3)	0 (0.0)
Moulds	05 (16.6)	1 (3.03)	0 (0.0)

\*  $p < 0.01$  as compared to vasomotor rhinitis and control group.

\*\* All the allergic reaction in these groups were of mild to moderate degree.

Figures in all parentheses indicate percentages of sensitive subjects in each category.

**Table-2:** Severity of Sensitivity to common environmental allergens in patients with allergic rhinitis, (n=30)

Allergens	No. Sensitive	Severity of Sensitivity		
		Mild*	Moderate**	Severe ***
House dust	26	04 (15.4)	01 (3.08)	21 (80.7)
House dust mites	21	01 (4.07)	04 (19.1)	16 (76.2)
Mixed thrashings	24	01 (4.02)	09 (37.5)	14 (58.3)
Straw dust	17	03 (17.6)	06 (35.3)	08 (47.1)
Hay dust	20	03 (15.0)	09 (45.0)	08 (40.0)
Mixed feathers	13	04 (30.8)	06 (46.2)	03 (23.1)
Cat Fur	16	03 (18.7)	02 (12.5)	11 (68.7)
Cotton Flock	15	06 (40.0)	05 (33.3)	04 (26.6)
Kapok	08	02 (25.0)	02 (25.0)	04 (50.0)
Tree pollens	12	05 (41.6)	04 (33.3)	03 (25.0)
Grass pollens	13	06 (46.2)	02 (15.4)	05 (38.4)
Moulds	05	02 (40.0)	02 (40.0)	01 (20.0)

\* Wheal with erythema up to 5 mm in diameter. \*\* Wheal with erythema between 5-8 mm in diameter.

\*\*\* Wheal with erythema more than 8 mm in diameter. Figures in parentheses indicate percentage in each category.

(IgE) with a specific antigen at receptor sites on the surface of specialized cells.<sup>5</sup>

Among in vivo methods to diagnose allergic disease, skin prick test assumes a major role for the identification of offending antigens. In present study, all allergic rhinitis patients were found positive to more than one allergen. These findings are consistent with those of other workers.<sup>6-9</sup> In a study carried out in patients with rhinitis and asthma, 88% demonstrated positive skin prick tests to the common inhalant allergens.<sup>10</sup> However, in a study carried out by Taylor and Broom,<sup>11</sup> forty three percent of the cases showed positivity to one or more allergens. Therefore, it seems that percentage of sensitivity to allergens commonly found in environment differs from area to area. Based on this data, it is clear that skin prick test can be used to find out the offending allergens in particular patients. It has been observed that an allergen panel consisting of house dust mites, cat fur and timothy can detect 85% of atopic patients with allergic rhinitis and asthma.<sup>12</sup> In present study, 26 (86.6%) out of 30 allergic rhinitis patients were found sensitive. Moderate and mild severity was observed in only 38% and 15.4% subjects. These findings are in accordance with those of other workers.<sup>13-15</sup>

According to studies carried out by these workers sensitivity to house dust was observed in 74.19% to 80% patients with allergic rhinitis. However, in study done by Holopainen and co workers,<sup>16</sup> sensitivity to house dust was seen in only 44% of cases. In their study also, house dust was observed to be the commonest allergen. House dust contains parts of bodies of house dust mites and their faeces. These mites are in beds, curtains, floor mats etc. Inhalation

of such a dust can produce allergic symptoms pertaining to nose and lungs. In the present study, 70% of allergic rhinitis patients were sensitive to house dust mites. Majority of these patients (88.7%) had some degree of sensitivity to this allergen. In comparison, sensitivity to this allergen was seen in very small percentage of vasomotor rhinitis (13.3%) and control groups (3.33%). Findings in the present study are similar to those of other workers.<sup>13,17,18</sup> In a study carried out on infants,<sup>15</sup> house dust mites were found to be the second commonest allergen responsible for symptoms of allergic rhinitis. Out of house dust mites, dermatophagoides pteronysinnus has been observed to produce the greatest number of cases of allergic rhinitis.<sup>9</sup> Several animals live in human habitations as pets or live stock. Proteins of these animals are potentially allergenic to the human beings. Allergic symptoms have been observed to be higher in patients having contact with domestic animals than in those who do not.<sup>19</sup> Cat fur allergy presenting as rhino-conjunctivitis and asthma is a wide spread clinical problem. In a study carried out on atopic patients, 57.44% were positive to cat fur allergen.<sup>21</sup>

### Conclusion

Skin prick tests provide an effective method to find out sensitivity to different allergens in cases with allergic rhinitis to differentiate these from patients with vasomotor rhinitis. Based on these findings the physicians can manage the patients in better way.

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