



## **Clinical Profile of Patients Undergoing Antigen Allergy Test in a Tertiary Care Centre in Kerala, India.**

Dr. Binu Krishnan. MD, FCCP, FAPSR.<sup>1</sup>, Dr. Priya Shanmugharaj <sup>2</sup>., Dr. Thansiya Pookunju <sup>3</sup>,  
Dr. Rajalekshmi Krishnamoorthy <sup>4</sup>.

1. Senior Consultant Pulmonologist, Department of Pulmonary and Sleep Medicine, PRS Hospital, India.
2. Junior Medical Officer, Department of Pulmonary and Sleep Medicine, PRS Hospital, India.
3. Clinical Pharmacologist, Department of Pulmonary and Sleep Medicine, PRS Hospital, India.
4. Clinical Pharmacologist, Department of Pulmonary and Sleep Medicine, PRS Hospital, India.

**Corresponding Author: Dr. Binu Krishnan.** MD, FCCP, FAPSR, Senior Consultant Pulmonologist, PRS Hospital, India.

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**Abstract**

**Background and objective:** Though allergies are major causes of chronic illness, very little data was available regarding the allergen profile in India. The objective was to identify the clinical profile of patients who underwent intradermal antigen allergy test.

**Methodology:** Retrospective data analysis of all consecutive adult patients who underwent antigen allergy test procedure at a tertiary care centre in India for a period of 66 months. Test dose of medications were introduced intradermally and results obtained as per standard protocol. Patients with a diagnosis of allergic rhinitis, asthma and / or atopic dermatitis were considered for allergy testing.

**Results:** 229 patients were included. The mean age was 36.77 +/- 12.13 years. Females constituted the majority with 59.8 % (N=137) compared to males (40.2%, N=92). Mean absolute eosinophil count was 478.53 +/- 196.11 cells/microliter. The mean IgE level was 318.01 +/- 285.50 IU/mL (.Most of the patients who came for allergy test had a diagnosis of allergic rhinitis with atopic dermatitis (N=132, 57.6%). House dust mite was the most common allergen in 217 patients (94.8%). That was followed by house dust (N=216, 94.3%), grocery dust (N=196, 85.6%), hevea (N=182, 79.5%) and wheat grain dust (N=148, 64.6%) in that order. Among fungi, *Aspergillus fumigatus* constituted the most (N=148, 64.6%) followed by *Candida albicans* (N=55, 24%). Prawn was the most common allergen among food products (N=70, 30.6%).

**Conclusions:** Understanding the clinical nature and epidemiological profile of allergens would help clinicians to develop targeted therapies which would be specific to their locality.

**Short title:** Clinical profile of antigen allergy test.

**Key-words:** intradermal test, allergy, atopic hypersensitivity, asthma, allergen, allergic rhinitis.

**Abbreviations:**

IGE: Immunoglobulin E

SD: Standard Deviation.

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## Introduction

Allergies constitute the sixth major cause of chronic illness in the United States. Allergic disorders, including asthma, allergic rhinitis, food allergy and eczema are common in all age groups attending the hospitals. According to the data published from the 2014 National Health Interview Survey (NHIS), 8.4% of children under age 18 suffered from hay fever, 10% from respiratory allergies, 5.4% from food allergies, and 11.6% from skin allergies in the US [1, 2]. The respiratory, skin as well as food allergies resulted in frequent disruption of normal activities, anxiety, and impact on relationships which in turn contributed to the poor quality of life. Very few clinical data is available regarding allergen profile of patients in India [3].

## Objectives

To identify the clinical profile of patients who underwent intradermal antigen allergy test.

## Materials and Methods

This was a retrospective analysis done in Pulmonary Medicine department In PRS Hospital, Trivandrum, Kerala. The institute was a tertiary care center with a dedicated allergy division. Intradermal allergy tests, including drug and antigen allergy tests, were routinely performed in the department. The medical records of all consecutive intradermal antigen allergy tests conducted in PRS Hospital from Jan 2102 to June 2017 over a period of 66 months were analysed for the study. Patients on anti -histamines were advised to avoid the drug for a minimum period of 6 days. Corticosteroids were withheld for a period of 7 days prior to the test. This study was performed in accordance with the Declaration of Helsinki. This human study was approved by Institutional Ethics Committee- PRS Hospital.

Patients with diagnosis of asthma, allergic rhinitis and /or atopic dermatitis were considered for allergy testing. As part of studying the adult patients, those below the age of 18 years were excluded from the analysis. Pregnant females and those patients with history of drug hypersensitivity in the preceding two weeks were not considered for the procedure.

Intradermal allergy tests were done in our centre as per the standard panels of allergens [4]. The allergens were broadly categorised as pollens, fungus, dust, food and others. The same panel was used in all patients. Allergens were used in the concentration of 1:500. Intradermal allergy were conducted as per the standard international practice. Buffered saline (1: 500) was used as the control for the entire test. Informed consent was obtained from all patients prior to the procedure. The whole procedure was done in the allergy clinic by pulmonologist. Vital signs including pulse rate and oxygen saturation were

monitored throughout the procedure using pulse oxymeter. All resuscitatory measures including crash-cart were available in the allergy clinic itself to address any potential medical emergency.

Serial numbers were marked in the anterior aspect of both right and left arms and forearms of patients with at least 2.5 centimetres separation in-between. Antigens were introduced in the dose of 0.1 ml intradermally with 26 size ½ inch needle. Region surrounding the cubital fossa was spared due to anticipated blood vessel prick during the procedure. A wheal of 5mm diameter was introduced with all antigens. The reactions were measured after 20 to 40 minutes. A wheal and flare of 10mm or more (more than or equal to double the initial size) was taken as the positive result. After the procedure, patients were made to wait for at least three hours to look for any delayed reaction. Upon completion of the whole procedure, all patients were advised to report to Emergency Room in case of any symptom of delayed reaction. After correlating with the patient's history, suitable patients were considered for subcutaneous immunotherapy. All antigens were used in 1:500 concentration for immunotherapy, except house dust mite which was used as 1:5000.

### **Statistical analysis**

Categorical and quantitative variables were expressed as frequency (percentage) and mean ± SD respectively. The data were entered into Microsoft Excel 2013 and analyzed.

### **Results**

The medical records of patients who underwent antigen allergy test in the institution from January 2012 to June 2017 (66months) were analysed. Two hundred and twenty nine patients were included in the study. The mean age was 36.77 +/- 12.13 (Range: 18 to 75) years (Table 1). Females constituted the majority with 59.8 % (N=137) compared to males (40.2%, N=92). Mean absolute eosinophil count was 478.53 +/- 196.11 cells/microliter (Range: 100 to 1750). The mean IgE level was 318.01 +/- 285.50 IU/mL (Range: 3 to 3111).

Most of the patients who came for allergy test had a diagnosis of allergic rhinitis with atopic dermatitis (N=132, 57.6%). A combination of allergic rhinitis, asthma and atopic dermatitis was present in 40 patients (17.5%). Atopic dermatitis alone was present in 37 patients (16.2%) (Table 2)

House dust mite was the most common allergen, which was present in 217 patients (94.8%). That was followed by house dust (N=216, 94.3%), grocery dust (N=196, 85.6%), hevea (N=182, 79.5%) and wheat grain dust (N=148, 64.6%) in that order. Among fungi, Aspergillus fumigatus constituted the most (N=148, 64.6%) followed by Candida albicans (N=55, 24%). Prawn was the most common allergen among food products (N=70, 30.6%). The mean number of allergens per patient was 9.12 +/- 1.96 (Range: 0 to 14) (Table 3). Immunotherapy was given for 226 out of 229 patients. Two patients were not willing for

immunotherapy and one patient had no demonstrable allergen. The mean number of allergens included in immunotherapy in each patient was 7.45 +/- 1.10 (Range: 0 to 8).

<i>AGE</i>	
Mean	36.77293
Standard Error	0.801609
Median	36
Standard Deviation	12.13054
Range	57
Minimum	18
Maximum	75

**Table 1.** Age distribution among 229 patients.

<b>Diagnosis</b>	<b>Number</b>	<b>Percentage</b>
Allergic rhinitis	10	4.36
Allergic rhinitis, atopic dermatitis	132	57.64
Atopic dermatitis	37	16.15
Allergic rhinitis, asthma	7	3.05
Allergic rhinitis, asthma, atopic dermatitis	40	17.46
Atopic dermatitis, asthma	3	1.31

**Table 2.** Clinical diagnosis of patients who underwent allergy test.

	<b>NUMBER</b>	<b>PERCENTAGE</b>
Albizia	70	30.56
Hevea	182	79.47
Oridoxa	96	41.92
Aspergillus flavus	4	1.74
Aspergillus Niger	35	15.28

Aspergillus Fumigatus	148	64.62
Candida albicans	55	24.01
Grocery dust	196	85.58
House dust	216	94.32
Old paper dust	135	58.95
Wheat grain dust	148	64.62
House Dust Mite	217	94.75
Prawn	70	30.56

**Table 3.** Sensitivity profile of various allergens.

## Discussion

In their study on allergen skin-test reactivity in a community sample, Barbee RA et.al found that the prevalence of allergy was highest in the 20 to 34year age group for most of the allergens and decreased thereafter with advancing age [5]. Dor-Wojnarowska, A et.al showed a sensitization of 37.7% in their study sample to at least one of the allergen tested [6]. Males demonstrated increased frequency of positive skin test ( $p = 0.003$ ). But asymptomatic sensitization was noted to be more in females ( $p = 0.04$ ). In the present study, mean age was 36.77 +/- 12.13 (Range: 18 to 75 years) which was almost in concurrence with the existing literature. But females constituted the majority with 59.8 % (N=137) compared to males (40.2%, N=92). Though the risk of allergy was greater for boys during childhood, there was a clear shift in favour of females, starting from adolescent age group onwards. This was even more pronounced in the case of atopic disorders like asthma, food allergies and anaphylaxis [7].

According to Fulkerson PC et al, eosinophilia could be detected in various disorders like atopic and allergic disorders, helminthic infection and adverse drug reactions, to name a few [8]. Eosinophilia could be characterized as mild (450–1500 eosinophils per microliter), moderate (1500–5000 eosinophils per microliter) and severe (greater than 5000 eosinophils per microliter). In a study on IgE and asthma, Kavitha Devi M et al suggested that serum IgE levels were elevated in asthma and this was also correlating with the degree of airflow obstruction [9]. In the present study, mean eosinophil count was 478.53 +/- 196.11 with a range from 100 to 1750. The IgE level was also significantly elevated with a mean of 318.01 +/- 285.50 (Range: 3 to 3111). The raised IgE levels might be a marker of phenotype of patients who benefit from anti-IgE therapies like omalizumab.

In a study on sensitization profiles in asthma, allergic rhinitis and eczema, Pullerits T et al found that only 2% of general population had concomitant asthma, allergic rhinitis and eczema [10]. In previously sensitized adults, only 6% had a combination of these three disorders. In persons with asthma, rhinitis

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and eczema, allergic sensitization was found in 78% while it was 65% in those with asthma and rhinitis but not eczema. This was 40% in those with asthma and eczema but not rhinitis and only 5% in those having asthma only. These values were different in the present study. Most of the patients in the present study had a diagnosis of allergic rhinitis with atopic dermatitis (N=132, 57.6%). A combination of allergic rhinitis, asthma and atopic dermatitis was present in 40 patients (17.5%) and atopic dermatitis alone was present in 37 patients (16.2%). There were marked differences when self-reported prevalence of atopic disorders in the open population was compared with physician diagnosed prevalence of atopy in a general practice setting [11]. So the data derived from an open population should not be extrapolated to that of a general practitioner setting. As new treatment options emerge, the importance of having epidemiological data regarding local disease patterns appear vital.

According to Seité S et al, pollens (63.13%) constituted the majority among self-reported allergies in adults in the United States [3]. Dust mite was the allergen in 42.12% and fungal mold in 35.08%. Food allergens were seen in 21.12% and cockroach in 7.04%. In the survey, self-reported allergies were more frequent in women. The authors believed that although men had higher rates of allergen sensitization, women were more likely to notice the allergy symptoms resulting from sensitization and self-report it. In the present study, house dust mite was the most common allergen, which was present in 217 patients (94.8%). That was followed by house dust (94.3%), grocery dust (85.6%), hevea (79.5%) and wheat grain dust (64.6%) in that order. Among various fungi, *Aspergillus fumigatus* constituted the most (64.6%) followed by *Candida albicans* (N=55, 24%). Prawn was the most common allergen among food products (30.6%). The higher level of environmental pollution might contribute to the higher occurrence of house dust mite and sensitization to various dusts. Also, Kerala is famous for the rubber plantations which might have resulted in increased hevea sensitization. It could serve as an important guide while planning public health programmes among rubber plantation workers and those in the vicinity in future. The relatively high humidity in Kerala could be a possible explanation for high occurrence of sensitization to fungi.

Allergen-specific immunotherapy with natural allergen extracts had been the only viable long term disease-modifying treatment for patients with allergic diseases. According to Gandhi F. Pavón-Romero et al, immunotherapy had a long term effect on symptom relief and also prevent allergic rhinitis from progressing to asthma [12]. But patients should be cautioned against the possible adverse reactions because of the allergy-inducing property of natural extracts. The side effects were usually described as harmless. In the present study, a vast majority of patients were started on immunotherapy and their long term outcome need to be studied further.

Our study had certain limitations. It was a retrospective analysis of the allergy profiles. Also, long term outcome of sub cutaneous immunotherapy in allergy could not be assessed from the present study.

	Contributor 1	Contributor 2	Contributor 3	Contributor 4
Concepts	•	•		
Design	•	•	•	•
Definition of intellectual content	•	•		
Literature search		•	•	•
Data acquisition	•		•	•
Data analysis	•		•	•
Statistical analysis	•	•	•	•
Manuscript preparation	•		•	•
Manuscript editing	•	•	•	•
Manuscript review	•	•	•	•
Guarantor	•			

## Conclusion

Allergies tend to effect a significant burden in the day to day activities of sufferers. As the prevalence of allergic disorders increase, it is increasingly becoming important to analyse the clinical nature and epidemiologic profile in every clinical setting. This would help the clinicians to devise better targeted treatment strategies against the allergens that are prevalent in their locality.

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