

**AEROALLERGEN PREVALENCE IN PUNJAB, INDIA**

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**ABSTRACT**

**Background:** An allergen is a substance capable of triggering a response that starts in the immune system and results in an allergic reaction. Both outdoor and indoor aeroallergens sensitize and exacerbate allergic asthma. Euroline allergy testing is an immunoassay that tests for allergen specific Ig E in patient's serum sample. **Objective:** Main objective of the study was to determine the prevalence of various aeroallergens by performing euroline allergy testing on blood samples of patients under study. **Methods:** It was a cross sectional study performed on 500 patients which were having respiratory symptoms of allergy. Sample of all patients were taken and processed for testing on euroline. Out of these 500 patients, were diagnosed with AR, with BA and having both AR and BA. Patients with immunoassay positive reaction for allergens were calculated along with allergen prevalence. **Results:** From total 500 patients, 440 patients showed a positive reaction on immunoassay testing which means they were sensitized. The most predominant aeroallergen came out be cockroach followed by house dust mite and Dermatophagoids farina. Majority of the immunoassay positive patients had both AR and BA being 323 (73.4%). **Conclusion:** As we observed from the results in the study that maximum patients were sensitized to indoor aeroallergens, most predominant being cockroach and dust mites. This points to need for individuals who might be already sensitized but not yet tested should volunteer for allergy testing in order to control early symptoms for developing AR or BA.

**INTRODUCTION**

Allergies have become a major health concern in today's world and India is no behind.<sup>[1]</sup> Allergy is a form of hypersensitivity response of any individual's body towards any substance in the environment. The disease may affect multiple organ systems in our body because of which the patient may present with various symptoms which also varying individual to individual. Depending on the type of organ involved, symptoms may be systemic in the form of hay fever or in many individuals skin and respiratory tract may be the affected organ systems in the form of atopic dermatitis, allergic asthma and anaphylaxis. Other non-specific symptoms are red eyes, itchy rash, sneezing, running nose, shortness of breath or swelling.<sup>[2]</sup> Such hypersensitivity responses are a combination of both genetic factors and environmental factors, basic pathogenesis of which involves Ig E antibodies which combines with the allergen which then binds to a receptor on mast cell or basophil triggering the release of histamine.<sup>[3,4]</sup>

Currently, more than 25% of the total population of India is sensitized with different forms of allergens.<sup>[5]</sup> Latest clinical data from different regions of India have shown a sharp increase in the prevalence rate of Ig E-mediated atopic disease in the last few decades.<sup>[6]</sup>

Allergen or substance causing allergy may be different for every individual. It is an environmental substance and may be in various forms arising from pollen- from trees, grass and weeds, fungal spores, food, poison, drug or chemical, dust mites, animal dander etc. Out of the above the most predominant aeroallergens arise from the pollen grains and fungal spores.<sup>[7]</sup> The Centre for Biochemical Technology under the Council for Scientific and Industrial Research, India, published a book with pollen calendars of 12 different states in India, providing information on the pollen seasons of various allergenic plants of India.<sup>[8, 9]</sup> An All India Coordinated Project on Aeroallergens and Human Health sponsored by the Ministry of Environment and Forests of the Government of India has been completed. Important pollen and fungal allergens from 18 different places have been identified, quantified and characterized for their allergenic properties. This provides the most scientific and up-to-date information on aeroallergens in India.<sup>[10]</sup>

Substantial data from the past studies well explain pollen grains as aeroallergens and important cause of pollinosis. John Bostock is the first one to suspect pollen as the causative agent behind allergic rhinitis (hay fever).<sup>[11]</sup>

Allergic rhinitis and asthma are both chronic heterogeneous disorders, with overlapping epidemiology of prevalence, health care costs and in quality of life.<sup>[12]</sup>

Aeroallergens are the most common causes of nasobronchial allergy.<sup>[13]</sup> Most important of them are pollens, dust mites, and animal products.<sup>[14]</sup> Plant pollens are one of the most common outdoor allergens. House dust mites *Dermatophagoides pteronyssinus* (*Df p*) and *Dermatophagoides farinae* are the most common indoor aeroallergens all over the world. Other aeroallergens animal origin, which are often described as a cause of respiratory allergies are cockroach, feathers and animal hair.<sup>[15]</sup>

With the help of Ig E serology testing for allergen, we have undertaken this study for identification of predominant aeroallergens in different ecozones of the country.

#### METHODOLOGY

It is cross sectional study which was conducted at Jerath Path labs and Allergy Testing centre, Jalandhar. In our study we performed allergy tests on 500 individuals which came to Jerath Path labs with respiratory allergic symptoms. There was no associated history of tuberculosis, diabetes mellitus, hypertension, endocrine disease, or coronary artery disease. Blood samples of all patients were taken, processed and tested for allergens with the help of Euroline allergy testing. Only 100-400 µl of serum is required for the test. Simultaneous

detection of specific Ig E against allergens within one incubation is performed. The tests were performed against Ig E specific for the numerous aeroallergens which can be responsible for causation of respiratory symptoms in the patient. We tested a series of 21 allergens which included various grass pollen, tree pollen, weed pollen, dust, fungi, insects, cotton, wool and silk antigens.

#### RESULTS

There was a total of 500 patients in the study comprising of 286 (57.2%) males and 214 (42.8%) females (TABLE 1). Out of these 500 patients 120 (24%) were diagnosed with AR, 34 (6.8%) were diagnosed with BA and rest 346 (69.2%) were having both AR and BA (TABLE 2). Out of the total of 500 cases which came to us with clinical symptoms of allergy, 440 came out to be sensitized with Ig E > 0.35 iUA/L. Rest of the 60 cases which showed no reaction for any allergen. The study showed maximum number of cases in 4<sup>th</sup> and 5<sup>th</sup> decade (62, 14.18%; 62, 14.18% respectively) and the least percentage was seen in the age group of 0-10 years (24, 5.40%). (TABLE 3) In our study we have used euroblot allergy testing procedure which uses a solid phase polymer in which patient's serum binds to Ig E specific allergen antigen. Specific Ig E levels higher than 0.35 iUA/L suggest sensitization.

**Table 1: Details of Study Population.**

Gender	Patients with Positive reaction	Patients with No reaction	Total
Male	230	56	286, 57.2%
Female	210	04	214, 42.8%
Total	440, 88%	60, 12%	500, 100%

**Table 2. Number of Patients Suffering from AR and/or BA with positive reaction immunoassay.**

Disease	No. of patients	Patients positive on immunoassay testing
AR	120 (24%)	96 (21.81%)
BA	34 (6.8%)	21 (4.80%)
AR and BA	346 (69.2%)	323 (73.40%)
Total	500 (100%)	440 (100%)

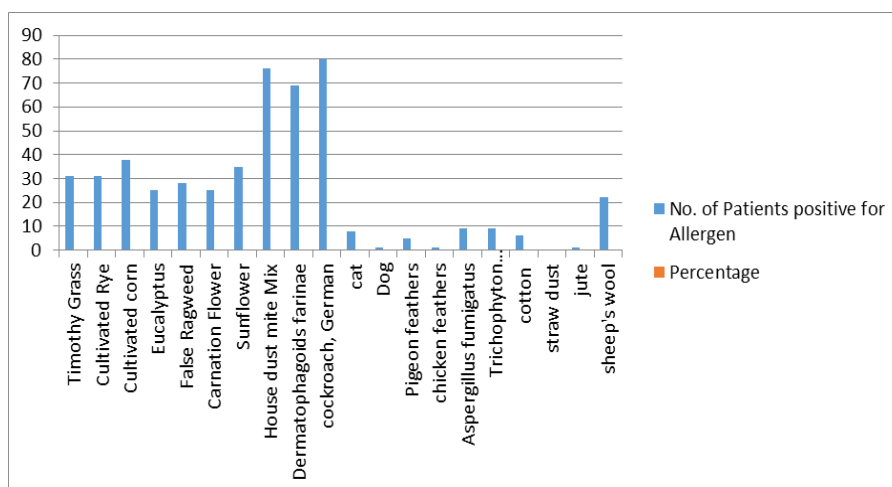
**Table 3. Age Wise Distribution of Patients with Positive Reaction on Immunoassay.**

Age group (in years)	No. of Patients	Percentage
0-10	24	5.40%
11-20	56	12.83%
21-30	59	13.51%
31-40	51	11.48%
41-50	62	14.18%
51-60	62	14.18%
61-70	54	12.16%
71-80	39	8.78%
>80	33	7.43%
Total no. of patients with positive reaction on immunoassay testing	440	100%

### Allergen Distribution

Cockroach was the most common allergen to which patients were sensitized (80, 18%), which was followed by house dust mite (76, 17.27%), Dermatophagoids

farinae (69, 15.68%). Our study showed no single case sensitive to straw dust. Percentage distribution of all the allergens has been shown in figure 1.



**Figure 1: Allergen Distribution.**

### DISCUSSION

Results from our study show that maximum number of sensitized patients are reactive to indoor allergens i.e. dust mites and insects like cockroach. This can be correlated to the fact that Jalandhar is a small city in Punjab with an area of 2632 Km<sup>2</sup> and a population of 8.6 Lakhs. Also the fact that maximum time of the year is covered by summer and the rainy season starting from mid April to end of September. All these conditions favour growth of dust mites as well as cockroaches. This pattern of sensitivity is quite similar to the patients study performed by Kumar R. et. al. in Vallabh Patel Chest Institute, University of Delhi.<sup>[15]</sup> Another study conducted at K.G. Medical college showed that the common offending allergens were insects (21.2%), followed by dusts (12.0%), pollens (7.8%), animal dander (3.1%), and fungi (1.3%).<sup>[16]</sup> Not much discrepancy is seen while comparing the male and female patients for sensitization to allergen, though male patients were slightly higher in number. Maximum number of patients having positive reaction to allergens were in the age group 41- 50 and 51-60 years with 14.18% for both. This was followed by age group 21-30 years being 13.51%. Least percentage of the patients were seen in the age group of 0-10 years and >80 years of age. Kumar R. et. al. study showed maximum number of patients in the age group 20-39 years and 30-39 years revealing minor difference only. Also Sharan N. et. al. study from K.G. Medical college also revealed similar results with maximum numbers of patients (261; 28.43%) between the age group of 20 to 29 years.<sup>[17]</sup>

### CONCLUSION

In our study we observed the prevalence of different aeroallergens in patients who presented with respiratory allergic symptoms and were suspicious of having Allergic Bronchitis and Bronchial Asthma and it

revealed to us that maximum number of patients were sensitized to these allergens with not much of gender difference. Our study also showed that the most prevalent aeroallergens were from insect dander and house dust mite to which the study patients were allergic. The study results are not only an important source of information to the clinicians but also an awareness for the society to keep indoors hygienic and use required preventive measures. Euroline allergy testing is an immunoassay which gives allergen specific results and is the best measure for diagnosing allergies in patients and also gaining the information on the increasing trend of allergies in India.

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