



Skin Prick Test in Naso-Bronchial Allergies: A Cross Sectional Study

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 01 Nov 2023	<p>Introduction: Allergy is defined as an overreaction of the immune system in response to the ingestion of certain foreign chemicals. The disease has been found to be more prevalent in males with predilection towards young adults who are less than 40 years of age. Indoor, outdoor or occupational agents are the most common classification for aero-allergens. "Skin Prick Test (SPT)" is the most definite and reliable methodology for diagnosing various allergic diseases which are mediated by IgE, in a patient with Naso-Bronchial allergies. Material and Methods: Cross sectional study was conducted on 120 patients with Naso-Bronchial allergy. Detailed clinical history, examination was done and SPT was performed using 25 allergens." Results: It was observed that insects were the most common allergen followed by mites, pollens and food respectively. Animal dander was the least common allergen. Amongst insects, Cockroach was the most common. Conclusion: On the basis of this study, we conclude that skin prick test is one of the most reliable, easily accessible and diagnostic test to detect IgE mediated allergic reactions."</p>
CC License CC-BY-NC-SA 4.0	Keywords: Skin prick, Naso-bronchial, IgE, Allergies, Aero-allergens

1. Introduction

Allergy is defined as an overreaction of the immune system in response to the ingestion of certain foreign chemicals. The reaction is called enhanced and exaggerated because these foreign elements are generally innocuous and innocent in nonallergic persons, and they have no effect on them or cause a reaction (1). The disease has been found to be more prevalent in males with predilection towards young adults who are less than 40 years of age (2).

Allergic reactions may be Cell-mediated or Antibody-mediated. In maximum instances, antibody inflicting an allergic reaction has been observed to be of IgE isotype (1). Allergic rhinitis along with Bronchial asthma are widespread chronic diseases that affect both children and adults around the world (3). Indoor (including mites, pets, insects), outdoor (pollens and moulds), or occupational agents are the most common classification of aero-allergens (4). "Skin Prick Test (SPT)" is a reliable methodology for diagnosing IgE mediated allergic disease in a patient with Naso-Bronchial allergy, among various diagnostic tests for detecting sensitizing allergens (5).

2. Materials And Methods

Study Design

This study was conducted in the Department of Pulmonary medicine in an institute in the north Himalayan region of India over a period of 12 months after obtaining approval from institutional ethical committee [/reg/int/2020/80(22)] on 20th February 2020. Subjects were selected from patients attending the OPD, IPD and Emergency of Departments of Pulmonary Medicine. 120 patients clinically diagnosed with Naso-Bronchial allergy were included. All the relevant clinical history including family history was recorded.

Thorough clinical examination was done. Certain Medications were avoided before skin prick testing like Oral Anti-Histamine (3-4 days), Oral Steroids (upto7 days) and Anti-Depressants. Skin prick

testing kit obtained from Merck Allergopharma, Mumbai which has 25 allergens which include Mugwort, Lepidoglyphus Destructor, Acarus Siro, Dermatophagoides Farinae, Tyrophagus Putrescentiae, Bermuda Grass, Eng Plantain, Rye Grass, K Blue Grass, Timothy Grass, Corn, Orchard Grass, Birch, Alder, Hazal, Fusarium, Aspergillus, Helminthosporium, Cow Epithelia, Hens Egg (Whole), Peanut, Cow's Milk, Barley Flour, Cockroach, Molds. Skin prick testing was done using 25 common allergens and sensitivity was assessed.

Procedure

Allergic skin testing was performed on the dorsal aspect of the forearm using an Epicutaneous test. The area was first prepared by cleaning it with a 70% alcohol swab. After that, a skin marking pen was used to indicate the area. A prick was made using a skin testing needle after a few drops of antigen were deposited on the specified spot. After 15 minutes, the result was obtained by measuring the diameter of the wheel. Wheels with a diameter of 0-3 mm were regarded negative, while those with a diameter of more than 3 mm were considered positive. The study's Negative Control was Normal Saline; Histamine was used as a positive control in the trial.

Data Management and Statistical Analysis

The data was collected and entered in MS Excel 2010. A graphical representation of the variable was shown to understand the results clearly and the categorical data was analyzed using Chi-square test. A 'p' value <0.05 was taken as statistically significant.

3. Results and Discussion

Results showed that maximum cases (n=58; 48.33%) were seen in the age group of 18-30 years. Male predominance was seen with 67 males (55.83%) with respect to 53 females (44.17%). Male: female ratio was 1.26:1. Maximum patients showed no history of any drug allergy (n=116; 96.7%) or any positive family history (n=90; 75%). All patients showed histamine sensitivity (n=120; 100%),

Results on overall sensitivity pattern in cases of Naso-Bronchial allergy are presented in Table1. It is observed that highest number (n=58; 48.33%) of the patients had Cockroach allergy, followed by Dermatophagoides farinae (n=46; 38.33%) and Rye grass (n=40; 33.33%). Hen's egg (n=1; 0.83%) was the least common allergen.

Table 1: Overall sensitivity pattern of allergens in cases of Naso-Bronchial allergy.

Irritant agent	Number	%
Cockroach	58	48.33
Dermatophagoides farina	46	38.33
Rye grass	40	33.33
Acarus siro	33	27.50
Lepidoglyphus destructor	32	26.67
Tyrophagus putrescentiae	29	24.17
Bermuda grass	27	22.50
Mug wort	21	17.50
Timothy grass	19	15.83
Corn	18	15.00
Orchard grass	18	15.00
K blue grass	17	14.17
Eng plantain	16	13.33
Birch	15	12.50
Alternaria	15	12.50
Cow epithelia	13	10.83
Barley flour	12	10.00
Aspergillus	11	9.17
Helminthosporium	9	7.50
Cow's milk	9	7.50
Peanut	6	5.00
Alder	5	4.17
Fusarium	4	3.33
Hazel	2	1.67
Hen's egg (whole)	1	0.83

Results of agents with more than 20% allergic study population are presented in Figure 1. It showed that out of 25 different irritant agents tested in the study, there were 7 agents to which more than 20% of the study population was allergic.

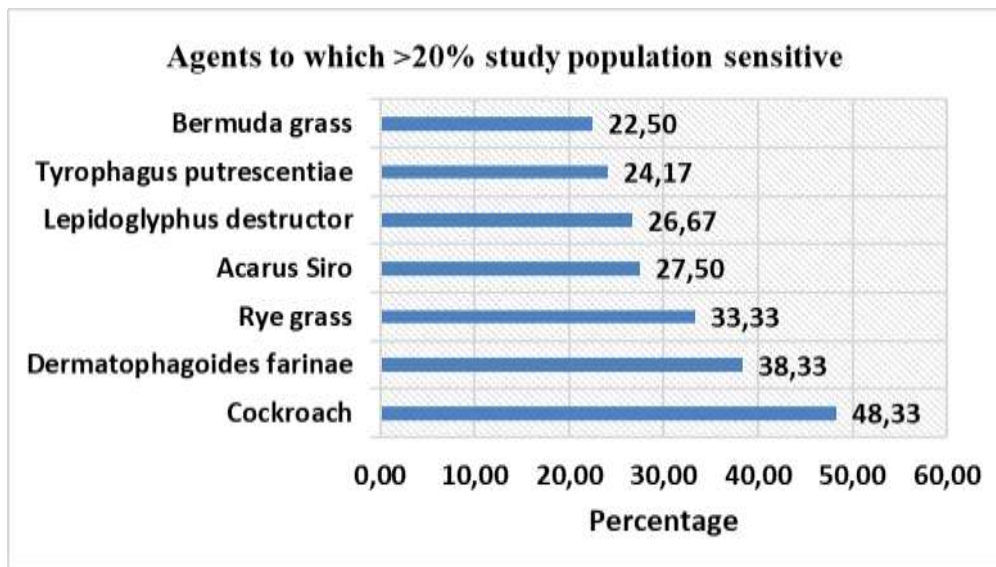


Figure 1: Agents to which >20% study population sensitive

Results of agents to which 10-20% population is sensitive are seen in Figure 2. It showed that there were 10 agents which showed 10-20% sensitivity. Amongst these, the most common agent was mug wort (17.50%) followed by timothy grass (15.83%).

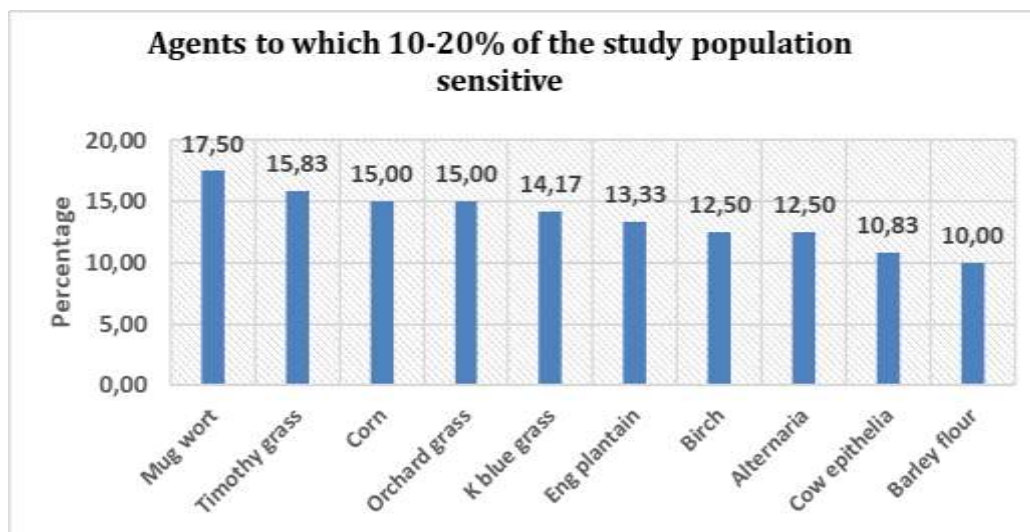


Figure 2: Agents to which 10-20% of the study population sensitive

Results of agents to which less than 10% population is sensitive are seen in figure3. It showed that study population was least sensitive to peanut (5%), fusarium (3.33%) and hen's egg (0.83%).

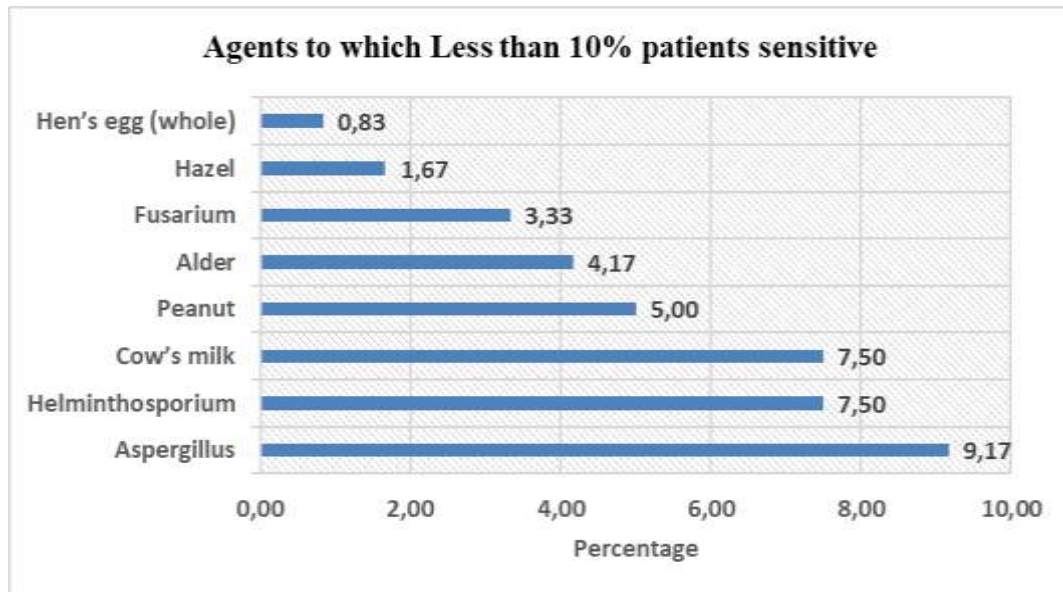


Figure 3: Agents to which Less than 10% patients sensitive

“Naso-Bronchial allergy” is a disorder involving the respiratory system. Dust particles, pollen grains, fungal spores, animal dander, and a variety of other allergens play a crucial part in this type of allergies, particularly in bronchial asthma and allergic rhinitis (6).

In our study, the range varied from 18 to 68 years with an average of 33.57+₋11.18 years. Moitra et al, too, found the mean age to be 32.87+₋18.17 with a range of 6-69 years (7).

In a study by Mondal et al, incidence of nasobronchial allergy was found to be higher in males with male: female ratio of 1.24:1 (8). However, studies by Nanda et al (9) showed a different result with female predominance of 1:1.5. In our study, there was a slight male preponderance with male: female ratio being 1.26:1.

Clinical symptoms of patients with naso-bronchial allergy can vary from nasal to pulmonary to involving eyes and gastrointestinal tract. In a study conducted by Nanda et al (9), it was seen that 63% patients (n=100) had nasal complaints followed by pulmonary with 32% (n=52). Similarly, another study by Giridhar et al stated that in 70% patients’ nasal symptoms preceded respiratory symptoms (4). Our study also showed similar findings with maximum patients having sore throat (70.83%), cough (65%) and stuffy nose (43.33%); while least common finding found was chest pain (30.83%).

In our study, 75% patients (n= 90) had no family history of atopy. Only thirty patients (25%) had family history. The results were in concordance with a study conducted by Nagaraj et al which also stated that 36.95% (n=68) had a family history of atopy (10)

In a study conducted by Surana et al (11) they stated a positive relation between raised AEC and serum IgE levels. It was seen that in cases with raised AEC, serum IgE was also raised (n=47) and only 11 cases did not show raised IgE levels. Our study, also, showed similar results with raised AEC, maximum cases (n=58) showed increased IgE levels. There were few cases (n=9) which showed raised IgE levels with a normal AEC count. Chi-square test was performed with a p value of <0.001 showing a significant result.

In our study, it was seen that most cases (n=64; 54%) showed perennial occurrence while the rest (n=56; 46%) showed seasonal variation. Our results were consistent with a study conducted by Surana et al (11) and Moitra et al (7) which showed 71% and 67.74% perennial occurrence respectively.

Skin prick testing (SPT) is the standard method world-wide to assess IgE-mediated sensitization to allergens. It is often the first method used for screening of possible causative agents in subjects with symptoms suggesting allergy (7,12). Histamine is used as control. The largest and perpendicular diameter of the wheal elicited by the allergens is measured and mean value is calculated. Wheal reactions with a mean diameter of more than 3 mm is regarded as positive, and less than 3 mm is negative. Patient are excluded if the responses to control solutions were not adequate. In our study all 120 patients were showed a positive reaction to histamine.

Out of these 120 patients, 109 patients (90.83%) showed a positive skin prick reaction while remaining 11 (9.17%) showed a negative reaction. Our study showed similar results to a study done

by Haahtela et al., (12) Among total of 3068 histamine positive patients, 2088 (68%) showed a wheal of more than 3mm and hence positive response while 980 patients (32%) had wheals <3mm (13).

Kumar, Rai and Shekhar (14) did a study to see the correlation of IgE with allergic sensitization in nasobronchial allergy patients and found that more than half patients (51.36%) were associated with more than 1000 serum levels, but statistically the result was not significant ($p>0.05$) (14). Similar to this study, our study also showed that patients with allergen sensitivity had higher IgE levels with mean of 1834, but the results were not statistically significant ($p>0.05$).

Skin prick test (SPT) is the most effective and cheapest diagnostic method to detect IgE mediated Allergic reactions. Positive SPT with a history suggestive of clinical sensitivity to identifiable allergens strongly incriminates the allergen as a contributor to Allergic rhinitis. In this study, the most common offending allergens were insects followed by mites and pollens. And the least common allergen was food. The common insect allergen was Cockroach ($n=58$; 48.33%).

The most common mite is Dermatophagoides farina ($n=46$; 38.33%) followed by Acarus Siro with 27.50 % ($n=33$) and Lepidoglyphus destructor ($n=32$; 26.67%) . Among pollens, the most common allergen was Rye grass ($n=40$; 33.33%) followed by Bermuda grass, mug wort and timothy grass with 22.50% ,17.50% and 15.83% respectively. Among animal danders, the common allergen was cow epithelia ($n=13$; 10.83%). Least common allergens seen were fungi-Fusarium (3.33%; $n=4$) and a food- hen's egg ($n=1$; 0.83%).

A study by Giridhar et al., also showed that most common allergen was insects i.e. male cockroach with 31.4% followed by female cockroach (22.8%) (4). Another study by Prasad et al (13) also states the most common allergen are insects (21.2%) followed by dust (12%) and pollens (7.8%) (24%). Acharya et al found prevalence of skin reactivity with insects (29.4%), dust (24.5%), pollens (10.4%) and fungi (7.4%) in this order among patients of nasobronchial allergy (15).

4. Conclusion

Skin prick test (SPT) is the most effective and cheapest diagnostic method to detect IgE mediated Allergic reactions. Positive SPT with a history suggestive of clinical sensitivity to identifiable allergens strongly incriminates the allergen as a contributor to Allergic rhinitis.

Conflict of interest

The authors declare that they have no conflict of interest.

Informed Consent

Informed consent was taken from the patients participating in this study.

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