

A Study of Skin Sensitivity to Various Allergens by Intradermal Test in Patients of Bronchial Asthma

Rajendra Prasad, Rajat Kumar, S.K. Verma, U.S. Pandey*

Department of Tuberculosis & Chest Diseases and Department of Physiology*, King George's Medical College, Lucknow

Abstract

Results of 5,760 skin tests with various allergens on 108 patients of bronchial asthma were studied. Most common offending allergens were insects (17.5%), dusts (15.4%), danders (13.8%), pollens (10.9%) and fungi (10.3%). Common insect allergens were grass hopper, locust and cockroach (male). Common dust allergens were wheat dust and paper dust. In danders common offending allergens were cow dander and horse dander. Among pollens *Cyperus*, *Cynodon*, *Lawsonia*, *Eucalyptus*, *Holoptelia*, *Brassica* and *Melia* were found to be common allergens. In fungus group *Fusarium*, *Penicillium* and *Aspergillus fumigatus* were common offending allergens. In the study, it was also observed that patients of bronchial asthma had associated allergic rhinitis in 62% cases.

Key Words: Skin allergy testing, Bronchial asthma, Allergens.

INTRODUCTION

Preliminary statistics available from India suggests that nearly 10% of the population suffers from one or the other allergic disorders. Prevalence of asthma has increased in last two to three decades. The increased prevalence may be due to change in the indoor as well as out door environment. Allergens are one of the many factors, which can provoke an acute attack of asthma. Skin allergy testing may be very useful to identify the offending allergen, if the proper clinical history is taken in patients of bronchial asthma. The present study was done to study the skin sensitivity to various allergens by intradermal test, in patients of bronchial asthma.

MATERIAL AND METHODS

Subjects: The study was conducted in patients of bronchial asthma attending the Department of Tuberculosis and Chest Diseases, K.G.'s medical college, Lucknow, and allergy testing was performed during 1995-1999. Pregnant and lactating females were not included in the study. For confirmation of the diagnosis-clinical evaluation, blood eosinophils, stool examination, sputum examination, x-ray of chest and paranasal sinuses, and pulmonary function tests were performed.

Skin sensitivity tests: Antigens were obtained from Center for Biochemical Technology, V.P. Chest Institute building, Delhi. 32 types of pollens, 18 types of fungi, 5 types of insects, 4 types of dusts and danders, 2 types of feathers and few others like-gum acacia, kapok cotton and wool extracts were selected for the present study.

Corresponding author : Dr. Rajendra Prasad, Professor and Head, Department of Tuberculosis & Chest Diseases, King George's Medical College, Lucknow (India)-226003.
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Before performing intradermal tests, oral drugs were stopped, but inhaled drugs were continued. Oral anti-histamines and tranquilizers were stopped 2 days before, and oral sympathomimetics were stopped 12 hours before performance of tests. If patient had been on oral corticosteroids continuously for more than 2 weeks then tests were performed 3 weeks after steroid therapy had been stopped.

About 0.01 ml of each extract in concentration of 1:500 w/v was injected intradermally. Buffer saline was used as a negative control.

Assessment of skin reactivity was done according to criteria proposed by Shivpuri¹, including modifications². Only 2+, 3+ and 4+ reactions were labeled as markedly positive skin reactions, because of high incidence of 1+ reactions in the non-allergic normal persons also. The positive reactions, which correlated well with the history, were considered as clinically significant reactions³.

RESULTS

In the study population, the patients were between 12-50 years of age, with a mean age of 28.1 years. Out of 108 patients, males were 56 while females were 52.

In this study, associated allergic diseases were also studied, and it was found that bronchial asthma was associated with allergic rhinitis in 62% patients. Bronchial asthma was present alone in 33.3% patients as shown in Table-1.

Out of 108 patients of bronchial asthma, in whom the allergy testing was performed 6 patients (5.56%) showed negative reactions to all the antigens tested. Rest of 101 patients showed skin reactivity of various grades.

Table-1. Patients of bronchial asthma and associated allergic diseases

Disease	No. of Patients	Percentage
Bronchial Asthma Only	36	33.33
Bronchial Asthma with Allergic Rhinitis	67	62.04
Bronchial Asthma with other Allergic Diseases	5	4.63
Total	108	100.0

In this study, a total of 5,760 skin tests were performed by a total of 68 allergens (pollens, fungi, insects, dusts, danders, feathers and some miscellaneous) on 108 patients of bronchial asthma. The results of skin reactivity are shown in the Table-2 and are arranged in decreasing order of their allergenicity based on frequency of markedly positive reactions (2+ to 4+) produced by allergens.

DISCUSSION

In patients of bronchial asthma, markedly positive skin reactions (2+ to 4+) were quite common for the various allergens tested. The common offending allergens found in the study were insects, dusts, danders, pollens and fungi (Table 2).

The markedly positive skin reaction to pollen antigens varied from zero to 18.5% (average 10.9%) in patients of bronchial asthma. The allergens showing high incidence of markedly positive skin reactions (2+ to 4+) were *Cyperus*, *Cynodon*, *Lawsonia*, *Eucalyptus*, *Holoptelia*, *Brassica* and *Melia* amongst the pollens. *Typha*, *Pennisetum* and *Dodonaea* did not show any markedly positive skin reaction indicating that these are not the common pollen allergens in this part of the country. A similar study was done by Agnihotri *et al*⁴ in Lucknow during 1969-71 to know the allergenicity of various pollens in allergic patients. Comparison with this study reveals that pollens like *Cynodon*, *Holoptelia*, *Prosopis*, *Amaranthus*, *Azadirachla* and *Chenopodium* were common in both the studies showing markedly positive skin reactions. But in our study some new pollens (*Cyperus*, *Lawsonia*, *Eucalyptus*, *Brassica* and *Melia*) were found showing markedly positive skin reaction.

In fungus, the markedly positive skin reactions varied from zero to 25.5% (average 10.3%) and the common fungal antigens were *Fusarium*, *Penicillium* and *Aspergillus Fumigatus*. *Neurospora* and *Epicoecum* showed no markedly positive skin reaction in any patients of bronchial asthma. Singh *et al*⁵ conducted a study in Lucknow 1980 to know common fungal spores prevalent in the city and to find out their allergenicity in allergy patients. Comparison from this study revealed similar common fungi showing markedly positive skin reactions, indicating

Table 2. Skin reactivity to various allergens extracts.

Sl.	Allergens	No. of Tests Performed	Average of 2+ to 4+ (%)	1+ (%)	2+ (%)	3+ (%)	4+ (%)
	Total	5760	11.48	21.93	9.29	2.08	0.1
A.	Pollens	2661	10.9	20.7	8.8	1.9	.08
1.	<i>Cyperus</i>	108	18.5	13.9	14.8	3.7	-
2.	<i>Cynodon</i>	108	16.7	21.3	10.2	6.5	-
3.	<i>Lawsonia</i>	30	16.7	3.33	16.7	-	-
4.	<i>Eucalyptus</i>	107	15.9	17.8	13.1	2.8	-
5.	<i>Holoptelea</i>	108	15.7	21.3	12.9	2.8	-
6.	<i>Brassica</i>	105	15.2	23.8	10.5	4.8	-
7.	<i>Melia</i>	108	14.8	24.1	11.1	3.7	-
8.	<i>Xanthium</i>	107	13.1	31.8	10.3	2.8	-
9.	<i>Pu'ranjiva</i>	31	12.9	25.8	12.9	-	-
10.	<i>Prosopis</i>	108	12.0	21.3	11.1	0.9	-
11.	<i>Zea mays</i>	108	12.0	23.1	10.2	1.9	-
12.	<i>Amaranthus</i>	108	11.1	25.9	8.3	2.8	-
13.	<i>Parthenium</i>	108	11.1	17.6	10.2	0.9	-
14.	<i>Azadirachta</i>	108	11.1	24.1	10.2	0.9	-
15.	<i>Gynandropsis</i>	108	11.1	25.9	10.2	0.9	-
16.	<i>Rumex</i>	31	9.7	3.2	9.7	-	-
17.	<i>Chenopodium murale</i>	31	9.7	29.0	6.5	3.2	-
18.	<i>Cenchrus</i>	31	9.7	41.9	9.7	-	-
19.	<i>Ageratum</i>	106	9.4	17.9	8.5	-	0.9
20.	<i>Ricinus</i>	108	9.3	15.7	7.4	0.9	0.9
21.	<i>Cassia</i>	108	8.3	23.1	7.4	0.9	-
22.	<i>Imperata</i>	108	8.3	17.6	5.6	2.8	-
23.	<i>Adhatoda</i>	37	8.1	16.2	5.4	2.7	-
24.	<i>Ailanthus</i>	37	8.1	5.4	8.1	-	-
25.	<i>Sorghum</i>	108	7.4	21.2	4.6	2.8	-
26.	<i>Morus</i>	108	7.4	17.6	6.5	0.9	-
27.	<i>Chenopodium album</i>	95	7.4	20.0	5.3	2.1	-
28.	<i>Cannabis</i>	93	6.5	19.4	6.5	-	-
29.	<i>Argemone</i>	107	5.6	19.6	4.7	0.9	-
30.	<i>Typha</i>	31	-	19.4	-	-	-
31.	<i>Pennisetum</i>	31	-	6.5	-	-	-
32.	<i>Dodonaea</i>	31	-	-	-	-	-
B	Fungi	1446	10.3	20.3	8.4	1.9	-
1	<i>Fusarium</i>	106	25.5	29.2	23.6	1.9	-
2.	<i>Penicillium</i>	108	15.7	18.5	8.3	7.4	-
3.	<i>A. fumigatus</i>	103	13.6	23.3	10.7	2.9	-

Table 2. (Contd..)

Sl.	Allergens	No. of Tests Performed	Average of 2+ to 4+ (%)	1+ (%)	2+ (%)	3+ (%)	4+ (%)
4.	<i>Streptomyces</i>	25	12.0	40.0	8.0	4.0	-
5	<i>A. flavus</i>	106	11.3	17.9	10.4	0.9	-
6	<i>Candida albicans</i>	106	11.3	20.8	10.4	0.9	-
7	<i>Helminthosporium</i>	108	11.1	18.5	10.2	0.9	-
8	<i>Cladosporium</i>	108	10.2	22.2	7.4	2.8	-
9	<i>Mucor</i>	106	9.4	12.3	6.6	2.8	-
10	<i>Alternaria</i>	108	8.3	14.8	8.3	-	-
11	<i>Micromonospora</i>	25	8.0	32.0	4.0	4.0	-
12	<i>Curvularia</i>	108	7.4	19.4	6.5	0.9	-
13	<i>Rhizopus</i>	106	6.6	12.3	5.7	0.9	-
14	<i>Actinomyces</i>	25	4.0	16.0	4.0	-	-
15	<i>Trichoderma</i>	31	3.2	25.8	3.2	-	-
16	<i>A. niger</i>	106	2.8	25.5	1.9	0.9	-
17	<i>Neurospora</i>	31	-	25.8	-	-	-
18	<i>Epicoccum</i>	30	-	16.7	-	-	-
C	Insects	286	17.5	31.1	13.3	4.2	-
1	Gross hopper	31	35.5	32.3	29.0	6.5	-
2	Locust	31	22.6	48.4	19.4	3.2	-
3	Cockroach (male)	107	21.5	31.8	15.9	5.6	-
4	Cricket	31	9.7	35.5	3.2	6.5	-
5	Cockroach (female)	86	6.9	22.1	5.8	1.2	-
D	Dusts	421	15.4	25.7	12.8	2.1	0.5
1	Wheat dust	105	21.9	26.7	16.2	4.8	0.9
2	Paper dust	105	16.2	31.4	12.4	2.9	0.9
3	House dust	106	12.3	22.6	11.3	0.9	-
4	Cotton dust	105	11.4	21.9	11.4	-	-
E	Danders	418	13.8	25.4	11.7	1.7	0.5
1	Cow dander	105	18.1	24.8	14.3	2.9	0.9
2	Horse dander	104	14.4	16.3	13.5	0.9	-
3	Buffalo dander	104	12.5	30.8	10.6	0.9	0.9
4	Dog dander	105	10.5	29.5	8.6	1.9	-
F	Feathers	211	5.7	21.3	2.8	2.8	-
1	Pigeon feather	105	5.7	22.9	2.9	2.9	-
2	Chicken feather	106	5.7	19.8	2.8	2.8	-
G	Miscellaneous	317	18.0	22.4	9.8	2.2	-
1	Gum Acacia	106	20.8	17.9	16.0	4.7	-
2	Kapok cotton	106	10.4	23.6	8.5	1.9	-
3	Wool	105	4.8	25.7	4.8	-	-

that there is no significant change in allergenicity with the fungi in last twenty years.

In the present study high incidence of markedly positive skin reactions were also shown by insects (average 17.5%), dusts (average 15.4%) and danders (average 13.8%). The allergens showing high incidence of markedly positive skin reactions were grass-hopper, locust and cockroach (male) amongst the insects; wheat dust and paper dust amongst the dusts; cow dander and horse dander amongst the danders. In the miscellaneous group gum acacia showed markedly positive skin reaction in 20.8% cases. Feathers did not show high incidence of markedly positive skin reactions. So it is suggested that the patients of bronchial asthma have a definite involvement of allergy as a causative factor.

The various studies conducted in other parts of country shows variable results. Studies conducted by Modi *et al*⁶, Acharya *et al*⁷ and Shankar *et al*⁸ showed more or less similar incidence of markedly positive skin reactions, while studies by Jain *et al*^{9,10,11}, Matah *et al*¹², Roy *et al*¹³ and Subhakar *et al*¹⁴ had shown a higher incidence of markedly positive skin-reactions. The differences in incidence of markedly positive skin reactions in various studies may be due to different flora in different geographical areas and change of flora over a successive time period due to change in the climatic factors.

The present study and such studies will definitely be helpful in identifying the allergens causing various allergic disorders including bronchial asthma in this part of the country. Furthermore, this study may also be useful in avoidance of allergens causing allergy and allergen immunotherapy. Further studies may be continued from time to time in this part of country to know the newer allergens causing allergic disorders.

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