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A Study of Skin Prick Test sensitization to common aeroallergens of Kolkata, India

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Abstract

Nasobronchial allergy accounts for a significant problem of allergy all over the world. The prevalence of aero allergy is increasing globally especially in India due to its diverse environmental and climatic condition. Aeroallergens like pollen, dust, fungi, dander and many other play important role in nasobronchial allergies. To study skin reactivity to various allergens in patients of nasobronchial allergy.Skin prick tests with 25 common aeroallergens were done on 1160 patients with a history of different nasobronchial allergic symptoms. Amongst all allergens studied other group of allergens i.e., common house dust and cotton dust allergens were more predominant, followed by pollens and molds. Amongst pollen group of allergen, most predominant allergens were Cocos nucifer(69.38%) followed by Peltophorium sp. (42.76%)and other common pollen allergens were Caesalpinia sp., Cynodon dactylon, both Carica papaya and Azadirachta indica, Eucalyptus sp., Areca catechu and Phonix sp. Among fungi Aspergillus niger, Cladosprrium sp., A .fumigatus , A .alternata, Penicillium sp., A.tamarii, C. albicans and Fusarium sp. were common. Amongst dust group of allergen, most predominant allergens were house dust (96.69%) followed by cotton. In Kolkata common allergens in patients of nasobronchial allergy were identified by skin prick test sensitization. The data may prove useful in of allergen avoidance and immunotherapy in these patients.

KEYWORDS: skin prick test, pollen, mold, house dust, nasobronchial allergy

INTRODUCTION

The increasing trend in allergic diseases has become obvious in the present day, especially in developing countries like India, because of many factors such as change in ambient air quality, increased air pollution, metamorphic change in living habits and lifestyle and climate. Aeroallergen sensitization can be evaluated using either skin testing or measuring IgE to different aeroallergens. Skin Prick Test (SPT) is an easy, cost-effective and convenient approach to identify sensitization of aeroallergens. Asthma is on rise worldwide including developing countries and in India alone, roughly 15% of the people suffer from this disease (1, 2). The prevalence of nasobronchial allergy is increasing globally as well as in India possibly due to change in environment. Allergens are one of the many factors, which can cause and trigger nasobronchial allergy. In atopic asthma, extrinsic factors like airborne allergens play a primary role in the initiation and precipitation of symptoms (3). For efficient diagnosis and treatment it is very important to know the aeroallergen

sensitive patients. The present study was done to identify the skin sensitivity to various allergens by Skin Prick Test in patients of aeroallergy.

MATERIALS AND METHODS

A total of 1160 patients aged 5-50 years were selected from the outpatients of Allergy & Asthma Research centre in the Kolkata metropolitan area from 2011-2013 following the criteria described earlier (4).The study group comprised 660 males and 550 females with a history of different allergic symptoms such as bronchial asthma, allergic rhinitis and urticaria. Fifty normal healthy individuals (25 male and 25 female) belonging to the same age group were also selected to act as control subject.

Allergy skin prick test (SPT) was carried out by conventional method of Gislason *et al*., 1999 (5). Standard allergen extracts were provided by Credisol India Limited. Prick test solution are glycerinated aqueous allergen extracts prepared after the method of Coca, 1922 (6). These solutions are standardized in terms of protein nitrogen unit (PNU) per ml. The extracts contain 50% glycerol and are preserved in 0.4% phenol. Histamine acid phosphate was used as positive control and Glycerosaline as negative control respectively. Since the aim of the present study is to identify the allergens responsible for causation of various allergic manifestations in patients' sensitive to dust and other common inhalants, the following allergens were selected for primary screening.

PROTOCOL OF SKIN PRICK TESTING

Skin Prick Test was applied on the flexor side of forearms. Before the test performing, both arms of the subject were thoroughly cleaned with water and dried in air. One small drop of the test solution was applied on the flexor side of the arm. The test side was approximately 4cm. apart from each other. A pre-sterile lancet was inserted through the skin inside the drop of extract at a 90^0 angle and lifted slightly. The same process was repeated for each test solution. The lancet was wiped carefully by means of cotton wool prior to its use for next solution. Any excess solution remaining on the skin after pricking was removed with the help of a tissue paper. The wheal size was recorded 20 minutes after application of the antigens by circling the reaction with a red coloured pen and transferred it to a test form with the adhesive tape. The wheal diameter was calculated along the mean of the widest diameter and the perpendicular diameter was measured at its midpoint and graded as 1^+, 2^+, 3^+, 4^+ as compared to positive control.

The Skin Prick Test method may vary from workers to workers and from laboratory to laboratory and hence it has not always been possible to compare the results obtained. In the present study, the interpretation of results was done on the basis of

comparison of reaction against a negative (-) or a positive (+) reference as suggested by Aas and Belin , 1972 (7) and graded following the method suggested by American College of Allergists, Grater *et al.,*1982(8). The antigens included 9 types of pollens, 8 types of moulds, 8 types of other allergens including house dust and house dust mites.

RESULT

The results of skin test sensitivity of different allergens are shown in Table I, Table II and Table III. Results of skin test among 1160 patients' against 25 different inhalants tested revealed that almost all the patients showed sensitivity to at least one of the 25 allergens tested.

Unfortunately studies on the relationship between pollen exposure and respiratory allergic disease in India, mainly in Kolkata are scarce, although grasses such as different species of *Cynodon* and pollen from trees of *Caesalpinia sp., Carica papaya, Cocos nucifera, Peltophorum sp., Azadirachta indica, Areca catechu, Eucalyptus sp.* and *Phonix sp.* are very common in Kolkata and its surroundings. Results of pollen sensitivity showed that out of 1160 patients,1078(92.93%) were sensitive to at least 1 of the 9 different pollen tested ,which proves that pollen of different origins are one of the common sources of aeroallergens in Kolkata metropolitan area. Detailed results indicated that among pollen-sensitive patients (**Table I**).

The majority(69.38%) showed a positive response to *Cocos nucifera,* followed by *Peltophorum sp.*(42.76%), *Caesalpinia* (42.02%), *Cynodon dactylon* (41.65%), both *Carica papaya* and *Azadirachta indica* (41.28%), *Eucalyptus sp. (*38.21%), *Areca catechu*(38.12%) and *Phonix sp.*(37.29%). It was observed that pollen sensitive-sensitive showed different types of clinical manifestations such as irritation of eyes and nose, urticaria, allergic rhinitis and bronchial asthma, either alone or in combination, mainly during the pollen season.

Mold is considered to be the most common aeroallergen in our environment, although sensitivity to mold allergens varied greatly from place to place. Total result among 630 males and 530 females showed **(Table II)** a high degree of sensitivity towards *Aspergillus niger*(45%), followed by *Cladosprrium sp.* (39.76%), *A.fumigatus* (35.23%), *A.alternata*(34.28%), *Penicillium sp*.(31.19%),*A.tamarii*(27.85%), *C. albicans* (21.90%) and *Fusarium sp*. (17.38%).

Other allergens included 8 common inhalants available in our environment **(Table III)** such as house dust, *D.pteronyssinus, D.farinae, Blomia tropicalis,* cotton, kapok, dog dander and cat dander. The results showed that 1151(99.22%) patients responded positively towards 1 of the 8 allergens mentioned above. The frequency of positive

responses was highest for house dust (96.69%), followed by cotton (93.65%), *D.pteronyssinus* (89.40%), kapok (85.57%), *D.farinae* (84.96%), *B.tropicalis* (42.31%), dog dander (9.81%) and cat dander (4.08%) caused fewer responses in comparison to the other allergens tested.

Table I: Skin Prick Test sensitization towards Pollen allergens

Allergens	No. of Positive Patients	Percentage of Positive Patients(%)
Pollens		
Carica papaya	445	41.28
Cynodon dactylon	449	41.65
Areca catechu	411	38.12
Eucalyptus sp.	412	38.21
Phonex sp.	402	37.29
Caesalpenia sp.	453	42.02
Cocos nucifer	748	69.38
Peltophorium sp.	461	42.76
Azadirachta indica	445	41.28
Total positive	1078	92.93

Table II: Skin Prick Test sensitization towards Mold allergens

Moulds	No. of Positive Patients	Percentage of Positive Patients(%)
Alterneria alternate	144	34.28
Aspergillus tamari	117	27.85
Penicilium sp.	131	31.19

Fusarium sp.	73	17.38
Aspergillus niger	189	45.00
Aspergillus fumigates	148	35.23
Cladosporium sp.	167	39.76
Candida albicans	92	21.90
Total positive	420	63.79

Table III: Skin Prick Test sensitization towards other allergens

Others	No. of Positive Patients	Percentage of Positive Patients(%)
House dust	1113	96.69
Dermatophagoides pteronyssinus	1029	89.40
Dermatophagoides farina	978	84.96
Blomia tropicalis	487	42.31
Dog dander	113	9.81
Cat dander	47	4.08
Cotton	1078	93.65
Kapok	985	85.57
Total positive	1151	99.22

DISCUSSION

A gradual increase increase in the incidence of nasobronchial allergic disorders among the population of Kolkata during last few years caused us to search for the aeroallergens responsible for allergy and identification of allergy sensitive patients. These findings are coincide with the previous study (9,1). Sensitivity to *Eucalyptus*

sp., Areca catechu, Phonex sp., Carica papaya, Cynodon dactylon and *Peltophorium sp.* Are also high in different allergic patients which was not reported earlier in the Kolkata region Podder *et al*.2006.Pollen allergens in nasobronchial allergies from different parts of India were reported (10,11,12,13,14).

In our present study skin prick test showed *Aspergillus niger* was the most predominant among fungal groups. The study conducted in 2006 (1) on allergens in nasobronchial allergy from the same centre, *Aspergillus fumigatus* was found as the most predominant fungal allergen. Other allergic fungal species were reported from different parts of India(15,16,17,18).

The next allergen group includes dust,dust mies and animal danders. The most common among these were house dust and cotton followed by house dust mites, kapok, dog dander and cat dander. These findings are coincide with the previous study (9,1,19,20) and reported total house dust as the most prevalent factor of nasobronchial allergy.

CONCLUSION

The common inhalant allergens in nasobronchial allergy in Kolkata region was assessed and compared with other studies. The pattern of aeroallergen sensitization in this study is totally different to other studies. Routine skin testing with a selection of common allergens can identify subjects from the population in whom inhalant allergens are sensitive. There is difference in the prevalence of allergen sensitivity in different regions due to different flora in different geographical areas and change of flora over a successive time period due to change in the climatic factors. Furthermore, there is a need of know about aeroallergens which shall be useful in avoidance of allergens causing nasobronchial allergy.

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