



ALLERGEN SENSITIZATION PATTERNS IN ASTHMATICS IN URBAN WESTERN INDIA EVALUATED BY SKIN PRICK TEST

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ABSTRACT **Background:** Skin prick allergy tests (SPT) are reliable, safe, rapid tests to diagnose IgE mediated response to specific allergens in patients where atopy is suspected. Identifying the particular allergen causing atopy has preventive and therapeutic implications.

Methodology: In this study conducted in an urban hospital in western India, we analysed sensitization to various allergens in 61 asthmatics by performing SPT.

Results: Patients were sensitized to house dust mites (34.82%), followed by fungi (26.7%), dust (25.4%) and plant pollen (22.68). Insects and pigeons were the allergen in 28.95% and 28% asthmatics patients respectively. Food allergies were noted to grams (31.28%), egg (29.23%) and milk (29.23%).

Conclusion: Allergen sensitization patterns depend on the local geographic, cultural and socioeconomic milieu and need to be studied in specific regions periodically, in order to prevent and avoid allergies, avert seasonal exacerbations and identify patients for allergen immunotherapy.

KEYWORDS : Asthma, Skin prick allergy tests

INTRODUCTION:

The prevalence of allergic disorders including asthma, allergic rhinitis, atopic dermatitis, food allergies has been rising globally with 20-30% of the world population affected by one or more allergic disorders¹. The World Health Organization (WHO) estimates that worldwide around 334 million people have asthma and this is expected to increase to 400 million by 2025². It is reported that more than 25% of the Indian population suffer from various forms of allergy³ while the estimated prevalence of asthma in India ranges from 2% to 23%⁴. Asthma places a high economic burden, significantly impacts quality of life and causes 250,000 deaths worldwide annually⁵. Sedentary lifestyle, industrialization, changing food habits, rise in air pollution, global warming, change in biodiversity and increased exposure to allergens along with reduced stimulation of the immune system in childhood (hygiene hypothesis) may further increase allergies and allergic diseases.

Identifying common allergens causing allergic disorders would a) allow targeted avoidance of allergens, thus preventing allergic disease b) determine the seasonal pattern so that timely treatment can be initiated c) identify patients for effective immunotherapy. The most convenient, relatively inexpensive, safe, accurate, rapid, sensitive and specific test to diagnose IgE mediated sensitization to specific allergens are the Skin prick allergy tests. Trigger factors for allergies vary with local milieu and food habits; hence it is important to study the prevalence of allergens in different areas especially in India which has such a diverse ecology, climate and culture. The present study aims to determine the sensitization patterns to various allergens in asthmatic patients in urban western India.

MATERIALS AND METHODS:

61 adult patients in an urban tertiary hospital studied over a period of about one year from around 2015 to 2016, were diagnosed to have Bronchial Asthma on the basis of their Clinical history, Physical examination, Complete Blood Counts, Xray Chest, Total serum IgE and Spirometry at an urban tertiary care hospital in Western India. After obtaining a written informed consent, they were subjected to Skin prick allergy testing (SPT) using a standard panel which included

aeroallergens like 3 dust mites, 15 fungi, 10 pollen, 8 dust mixture, 4 epithelia including pigeon droppings and 4 insects along with 18 types of food allergens and positive and negative control. Smokers, Children < 12 years old, lactating and pregnant women were excluded from the study. Oral antihistaminic drugs were stopped for at least 7 days prior to the test and those patients where they could not be discontinued because of exacerbation of symptoms, were excluded. Asthmatics who were on oral steroids were excluded, but after discontinuing steroid therapy for three weeks, SPT was carried out. Inhaled Bronchodilator therapy and inhaled corticosteroids were continued in all asthmatic patients. The test was performed on the volar aspect of both arms and back by sterile disposable lancets. A drop of the allergen extract was placed on the skin surface and a prick made. Histamine was used as a positive control and normal saline as the negative control. The reaction was read after 20 mins by comparing the wheal and induration to the control reaction. A wheal of ≥ 3 mm diameter was defined as a positive result and was graded in comparison to histamine as 1+, 2+, 3+ and 4+ that is 25%, 50%, 100% and 200 % of wheal induced by histamine. Only 2+ and above were labelled as positive skin reactions.

RESULTS:

In our study all the patients were in the age group between 14 to 52 years, with mean age being 25 years. Male to female ratio was almost equal. 23.07% had mild, 38.48% had moderate, and 7.69% had severe obstructive airway disease respectively on Spirometry while 30.76% had normal spirometry. 28% of patients gave history of recurrent colds, sneezing on exposure to various allergens like dust, perfumes, change of weather. 38% had family history of asthma. SPT was negative in 2 patients while the remaining showed polysensitization to various allergens. Patients were predominantly sensitized to house dust mites (Der. farinae-41.82%, Der. pteronyssinus - 39.57% and Blomia-23.07%), followed by fungi (average 26.7%), dust (average 25.4%) and plant pollen (average 22.68). Insects especially the housefly and mosquito was the allergen in 36.2% and 27.6% of asthma patients. Food allergies especially to grams (31.28%), egg (29.23%) and milk (29.23%) were noted. Pigeons (feathers and droppings) accounted as an allergen source in about 28% asthmatics. The results of allergen sensitization by skin reactivity are shown in Table 1.

Table 1: Results Of Allergen Sensitization By Skin Prick Allergy Test

ALLERGEN GROUP	MITES	FUNGI	PLANTS/ POLLEN	DUST	ANIMAL	INSECTS	FOOD
%SKIN PRICK +VE	Dermatophagoides farinae: 41.82%	Candida albicans: 33.08%	Amaranthus spinosis: 28.88%	House dust: 30.68%	Dog epithelia: 19.45%	Housefly: 36.2%	Green gram: 31.28%

	Dermatophagoides pteronyssinus: 39.57%	Fusarium solani: 30.98%	Cynodactylon (bermuda grass) : 26.38%	Cotton dust: 27.88%	Chicken feather: 19.1%	Mosquito: 27.6%	Egg whole: 29.23%
	Blomia: 23.07%	Penicillium spp: 25.4%	Eucalyptus: 23.07%	Paper dust: 22.9%	Pigeon feather: 17.7%	Rice weevil: 27%	Milk: 24.19%
		A. flavus: 27.14%	Ischaemum indicum: 18.75%	Rice dust: 22.9%	Pigeon dropping: 11.1%	Cockroach: 23.07%	Peanut: 20.34%
		A. niger: 24.64%	Ricinus communis (castor plant): 16.34 %	Wheat dust: 22.72%			Green pea: 20.8%
		A. fumigatus: 19.23%					Masoor dal: 20.07%

DISCUSSION:

This study was conducted to ascertain the allergic sensitization pattern in patients predominantly having asthma, and living in an urban environment in Western India. It was found that all patients with a positive SPT showed polysensitization and this may result in a more impaired quality of life compared to monosensitized patients⁶. The common sensitizing aeroallergens in this study were house dust mites, fungi, plants. Interestingly allergy to insects like the housefly, mosquito, cockroach and rice weevil was highly prevalent. Both mites and insects thrive in unsanitary conditions, indicating the need to keep our surroundings extremely clean especially if a person has asthma. It is thus important to counsel asthmatic patients regarding vacuum cleaning, frequent change and washing of bedsheets, not having clutter in the house, avoiding carpets and thick curtains, use of protective covers and living in hygienic surroundings.

Rasool R et al.⁶ who studied the role of SPT in allergic disorders in Kashmiri population found that pollens followed by house dust mite (*D. pteronyssinus*) were the most common allergens. Dusts and cockroach were also common whereas, fungi, dog and cat were uncommon. They have attributed this to the fact that the area is highly enriched with natural flora and that the inhabitants studied live in close proximity of farmlands, meadows and forest areas. None of the patients tested positive for dog or cat animal allergy. Hendricks et al.⁷ analyzed skin prick test reactions in 656 asthmatic patients and reported sensitization to pollens in 66%, animal danders in 38%, *Aspergillus fumigatus* in 16%, and other moulds in 21%.

This contrasts with our study where mites were the most common aeroallergens, followed by insects like house fly, mosquitoes and cockroaches. Fungi, dust and pollen were equally prevalent allergens. We also found that pigeon feathers and droppings were an allergen source in 28.8% asthmatics in our study. The high sensitization due to pigeons which is not reported in other studies, can be attributed to the fact that there is a concentration of these birds in urban western India due to a custom of feeding them in specific areas reserved for that purpose. This shows the importance of mapping out sensitization patterns in different areas. Understanding the antigen or allergen pattern in specific areas helps to suggest avoidance, prevention of seasonal allergies and immunotherapy as necessary.

Thus this study along with various other studies confirms that the patterns of aeroallergens in the environment differ widely in different localities and depends on the natural flora and fauna and the climate of that region. The socio cultural background, lifestyle and eating habits of the people of that region are also important in determining the allergens to which they become sensitive.

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