

Prevalence of Aeroallergens in Childhood Asthma in Mashhad

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Abstract

Background. Atopy is defined as the genetic propensity to develop immunoglobulin E antibody in response to exposure to allergens and may be assessed by skin prick test (SPT).

Aim. The aim of this study was to investigate the pattern of sensitization to aero-allergens with SPT among asthmatic children in Mashhad (North east of IRAN).

Material and Methods. The study population consist of 133 (83 boys, 50 girls). The age of the patients ranged between 3-14 years (Mean 7.84 ± 3.06). Asthmatic children assessed by skin prick test with 9 common regional aero-allergen (pollens, house dust, feathers, cockroach). The study was conducted between January 2008 and December 2009.

Results. Among 133 patients with asthma 84 (63.2%) had positive SPT to at least one of the aero-allergens. Allergy to pollens was the most prevalent sensitizing (57.1%), followed by allergy to house dust mite, feathers, and cockroach (19.5% , 9% , 6%) respectively.

Conclusion. Our result confirmed that pollens are the main sensitizing aero-allergens among patients with asthma in Mashhad. Among pollens the highest positive rate belonged to weeds.

Introduction

Asthma is one of the most common chronic diseases among children. It was hypothesized that atopy is the strong background predisposing to asthma. Asthma and atopy are related conditions caused by a complex interaction of genetic factors and environmental influences.

One of the most important environmental factors is aeroallergens. Aeroallergens are air-born particles induce allergic reactions in sensitized subjects and can cause respiratory allergy. Sensitization to either indoor

(dust mites, cockroaches, pets, molds) or outdoor (pollens, molds) allergens is a major contributor to both chronic airway inflammation and acute asthmatic symptoms and should be considered when evaluating children or adolescents with asthma.

For diagnosis of a allergic disorders besides history and physical examination many in vivo and in vitro laboratory tests are used. Skin prick test is an easily performed and valuable test in children.

The aim of this study was to evaluate the prevalence of aeroallergens identifiable by skin prick test in

children suffering from asthma.

Material and Methods

Skin prick test with nine aeroallergens was performed on one hundred thirty three asthmatic children aged 3-14 years (mean 7.84 ± 3.06) attending the pediatric allergy clinic of Dr. Sheikh Children Hospital in Mashhad (Northeast of Iran). The nine allergens included: pollens [Tree (Ashe, Tree mixture), Grass mix, Weed (*Russian thistle*, *chenopodiacea*)], mites (*Dermatophagoides pteronyssinus*, *Dermatophagoides Farine*), feathers mixture, and cockroach.

Asthma was diagnosed in children under 5 years according Asthma Predictive Index and asthma was diagnosed in children > 5 years according clinical manifestation and pulmonary function test.

We performed all SPTs according to standard procedures, using purified allergen extracts. Positive and negative controls were histamine (10 mg/ml) and normal saline, respectively. The allergenic extract was placed on the volar surface of forearm and introduced into the epidermis by a disposable hypodermic needle. The results were measured 15 minutes after application. Data were excluded if the saline control was larger than 3 mm and the histamin control less than 3 mm. A reaction was deemed positive if the resulting wheal was at least 3 mm by 3 mm. Measuring the largest diameter and the diameter perpendicular to it, if there were any wheal with the negative control, a test will had to be at least three millimeters larger than the negative control in both diameters to be deemed positive.

Children were considered to be atopic if they had at least one skin test result. Any patient history of other allergic disease, such as allergic rhinitis, atopic dermatitis and any family history of allergic disease was also recorded.

Results

Out of 133 children with asthma 84 (63.2%) had positive SPT to at least one of the aeroallergens. 31.6% of patients with positive tests were in age group 6-10 year and 16.5% were older than 10 years. Only 6% were found in age group 3-5 years (Table 1).

Patient were presented with intermittent asthma, mild persistent asthma, moderate persistent asthma and sever persistent asthma in 2.3% , 35.3%, 56.4% and 6%, respectively. More than 50% of the children had

Table 1: Association between SPT with age group.

Age group (Years)	Positive test		Negative test	
	Frequency	Percent (%)	Frequency	Percent (%)
1-5	8	6	15	11.3
6-10	42	31.6	37	27.8
>10	22	16.5	9	6.8
Total	72	54.1	61	45.9

allergic diseases other than asthma, the most common were allergic rhinitis (44.4%) and atopic dermatitis (10.5 %). Frequency of positive family history of atopy in patients was 54.1%.

The prevalence rates for allergen group were: Pollens (57.1%), mites (19.5%), feathers mixture (9%) and cockroach (6%) (Table 2). Pollens were the most common aeroallergens among patients with asthma in Mashhad. Among pollens the highest positive rate be-

Table 2: Frequency of positive skin prick test among children with asthma in Mashhad.

Allergen	Number of subjects with positive test	% frequency of all positive cases
Pollens		
Weeds	71	53.4
Grasses	19	14.3
Trees	33	24.8
Mites		
<i>D. Pteronyssinus</i>	16	12
<i>D. Farinae</i>	24	18
Feathers mixture	12	9
Cockroach	8	6.0

longed to weeds (53.4%). Among weeds the highest positive rate belonged to Russian thistle (*salsola kali*).

The second common pollens were trees (24.8 %) among which Ashe was the most common. The third common pollen was grass (14.3 %). Among our patients 22.6% had monosensitisation and 18% had allergy to four or more allergens on SPT.

There was no significant difference between gender and skin test positivity ($p = 0.723$). We found statistically significant direct correlation between age and skin test positivity ($p = 0.003$). Among our patients, mite was found as the second most frequent allergen after pollens.

Out of 133 children with asthma, 59 patients had allergic rhinitis and all had positive SPT. 14 patients had atopic dermatitis but only 1 (7.1%) patient had negative SPT. This indicates a close relationship between a positive SPT with other allergic disease.

Out of 133 children with asthma, 72 (54.1%) patients had a family history of allergic disease among whom 53 had positive SPT that showed significant

correlation between SPT positivity and positive family history.

Discussion

The role of the environment in the pathogenesis of asthma has become increasingly obvious as the evidence for regional variation in the prevalence of allergic disease has accumulated [1-5]. Although an increasing number of gene loci have been linked to asthma and atopy [6], genetic factors alone cannot explain the marked differences in the prevalence of allergic disease in population-base studies.

Among the proposed environmental factors related to asthma pathogenesis, allergen sensitization has been most widely implicated in susceptible individuals.

This study demonstrated that aeroallergen sensitization was found in more than 50% of children with asthma referred to Allergy Clinic in Mashhad.

The most frequent aeroallergen detected by SPT was pollens (57.1%). The rates of sensitization to mites and feathers and cockroach were (26%, 9%, and 6%), respectively. Among pollens, weeds had the highest rate of sensitization, among which Russian thistle (*salsola kali*) was the most common. Considering dry climate and regional herbal geography of Mashhad this results were expected.

In previous study conducted in Iran (Shiraz [7] and Tehran and Karaj [8]), prevalence pattern of different types of pollens (weed, grass, trees) was the same as in our study. In southwest Germany, grass pollens were found to be the major allergens by skin test reactivity [9]. In Portugal the most representative aeroallergen sensitization was grass mixture (44.9%).

The highest pollens count in this region could explain the early sensitization even in young children [10]. In Ankara, grass pollens were found to be the major allergens, by skin test reactivity comparing to Seoul which weeds and trees were found as the major outdoor allergens.

Herbal geography, climate and temperature are responsible for the variation [11]. In Mediterranean coast of southeastern Spain, weeds (*salasola kali* and *chenopodium*) were frequent causes of respiratory allergy [12]. In most desert environment (for example Kuwait), pollens may be important sensitizing allergens in patients. In Kuwait, pollens (87.1%) were found to be the major allergens. The most prevalent sensitizing

pollens were from *chenopodiace* (70.7%) [13]. In Saudi Arabia, SPT data revealed higher degree of sensitization to weeds pollen [14].

In contrast, in many humid countries dust mites were the most important cause of sensitization in asthmatic children, because mites tend to require high humidity to thrive [15,16]. In Hong Kong, HDM was the most common sensitizing aeroallergen house dust mite (HDM) (81.9 %) in asthmatic children. In addition, HDM was reported to have the highest rate of sensitization among patients with asthma in Chicago [17], United Kingdom [18], Istanbul [19], Thailand [20], and Malaysia [21].

Conclusion

In childhood bronchial asthma, the allergic component is the major factor leading to bronchoconstriction. The result of the present studies indicates that pollens play an important role in childhood asthma in Mashhad and sensitivity to outdoor allergens is more prevalent than sensitivity to indoor allergens.

Our work showed the importance of weeds; especially Russian thistle families, in Mashhad. This was expected based on herbal geography and climate. *Salsola kali* in various regions of Iran can be found most likely due to high soil nitrate, which is also true for Mashhad. There is a need for further studies to define the role of other allergens in Iran.

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