

Hypersensitivity to House Dust Mite and Cockroach Is the Most Common Allergy in North of Iran

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ABSTRACT

Background: Asthma and allergic rhinitis are among the most common diseases in the world. **Objective:** The aim of this study was to detect, by skin prick test, aeroallergens in allergic patients in Sari, Mazandaran in north of Iran. **Methods:** This is a prospective study of skin prick test of aeroallergens in asthma, allergic rhinitis and their combination with clinical diagnosis. Three hundred and seventy five cases aged between 5 to 50 years, were referred to Tooba and Boo-Ali allergic centers of Mazandaran University of Medical Sciences between December 2006 and July 2009. The aeroallergens studied included house dust mites (*Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*), cockroaches, feather, aspergillus, Alternaria, pigweed, nettle, oak and maple. **Results:** Of the studied individuals, 175 cases were males (46.7%) and 200 were females (53.3%), of which 156 (n=41.5%) reacted to allergen extracts. In asthma, allergic rhinitis and their combination, the respective positive percentages were 26.6%, 22.9%, and 32.6% for *Dermatophagoides farinae*; 26.6%, 25.3%, and 23.3% for *Dermatophagoides pteronyssinus*; 12.7%, 17.4%, and 11.6% for cockroaches and 16.5%, 4.7%, and 7.0% for the feather. Other allergens were positive up to 5 percent. Total IgE levels were elevated in 56.4%, 53% and 60.5% of asthmatic, allergic rhinitis and the combination group, respectively. Eosinophils count was elevated in 40.5%, 33.2% and 37.2% of the same groups, respectively. **Conclusion:** The hypersensitivity to house dust mites is very common in north of Iran which may be attributed to the warm and humid weather of this area.

Keywords: Allergens, Allergic Rhinitis, Asthma, Prick Test

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INTRODUCTION

The prevalence of skin prick test (SPT) reactivity in any population depends on age, sex and geographical factors. Allergic rhinitis (AR) is an inflammatory condition mediated by IgE after allergen exposure and has the characteristic symptoms of watery nasal discharge, sneezing, itchy and stuffy nose and affects 10-25% of the population (1). It is mostly due to allergic reactions to aeroallergens including house dust mites, pollens, animal dander, and molds. The types of aeroallergens, however, differ widely depending on localities and even vary both within and between countries (2). Approximately, 20% of AR is strictly seasonal, 40% perennial and 40% mixed (3). Asthma is a chronic inflammatory disease with classical symptoms including cough, dyspnea and wheezing. Allergic conditions have increased during past decades, and pose a heavy burden on health care systems (4). Asthma is a major cause of chronic morbidity and mortality throughout the world and is characterized by paroxysmal spasmodic narrowing of the bronchial airway due to inflammation of the bronchial tree and contraction of the bronchial smooth muscles (5). It is well known that rhinitis and asthma coexist in many patients. AR is a recognized risk factor for asthma, with 20–30% of such patients having asthma; conversely 60–80% of patients with asthma have coexisting AR (6, 7). Common risk factors include exposure to allergens including domestic house dust mites, animals with fur, cockroaches, pollens and molds, occupational irritants, respiratory infections, exercise, air pollution and tobacco smoke. Allergic disorders are diagnosed by a proper history, physical examination and some paraclinical findings such as serum total immunoglobulin E (IgE), eosinophil count, specific IgE, SPT, radio-allergo-sorbent test (RAST) and respiratory function test. This study was designed for the detection of the prevalence of skin reactivity to different aeroallergens in patients with asthma, AR and combination of both, in northern Iran (Sari) for devising proper management strategies.

MATERIALS AND METHODS

A prospective study was designed and 375 patients with diagnosed allergic rhinitis, asthma or both, based on GINA criteria were selected (8). These patients were referred to the allergic clinic of Boo-Ali hospital in Sari during 2006 – 2007. We selected allergic rhinitis and asthma patients who had been ill for a minimum of 1 year to establish the diagnosis and exclude other identifiable causes by virtue of their clinical history and physical examination. Patients with chronic sinusitis or other infective causes of chronic rhinitis were excluded. Patients with similar nasal symptoms due to atrophic rhinitis, nasal polyposis, nasal tumors, or other known causes of non-allergic rhinitis including occupational rhinitis, aspirin sensitivity, endocrine disease, pregnancy, and drug-induced rhinitis were also excluded. At least 375 cases (175 males and 200 females), who had a provisional diagnosis of allergic rhinitis, asthma or both were selected to undergo further workup to skin prick test for aeroallergens. Out of 375 patients, 79 had asthma (34 males and 45 females), 253 had allergic rhinitis (119 males and 134 females) and 43 had both asthma and allergic rhinitis (22 males and 21 females). The mean duration of their symptoms was 12 years with a range of 1 to 51 years for allergic rhinitis and 10 years for asthma (with a range of 1 to 45 years). For at least 1 week, none of patients took any medication including antihistamines, steroids,

and other drugs considered to affect skin prick testing by a specialist. Patients who had active skin disorders or dermatographism were not considered suitable for SPT. The tests were performed according to standard methods with allergens, using histamine-positive and -negative controls purchased from Stallergen-SA, France. The skin prick reaction was read after 15 minutes and was considered positive when the reaction wheal diameter was at least 3 mm larger than the negative control.

Information chart of patients including data on sex, age, symptoms and signs of the disease, pattern of allergic disease (seasonal or perennial), family history of atopy, CBC results, level of IgE and response to aeroallergen such as *Dematophagoides farinae* (*D.f.*), *Dematophagoides pteronyssinus* (*D.p.*), cockroaches, feather, pigweed, aspergillus, Alternaria, nettle, oak, and maple were reviewed. Local ethical committee approved this study.

RESULTS

Among 375 patients with AR, asthma, or both, female/male ratio was 1.14/ 1. Age of patients was between 5 to 50 years with a mean of 13.5 ± 10.5 years. In this study, we selected 79 (21.06%) patients with asthma, 253 (67.46%) with AR and 43 (11.46%) with both bronchial asthma and AR (Table1).

Table 1. Age and gender distribution in patients with allergic rhinitis, asthma and a combination of both (total=375).

Age(y)	AR (n/%)	asthma (n/%)	both (n/%)	total (n/%)
<10	38/ 15	20/25.3	12/27.9	70/18.7
10-20	92/36.4	29/36.7	10/23.3	131/34.9
20-30	77/30.4	15/19	14/32.6	106/28.3
>30	46 / 18.2	15/19	7/16.3	68/18.1
Total	253/ 67.46	79/21.06	43/ 11.46	375/100

Gender				
Male	119/47	34/43	22/51.2	175/46.7
Female	34/53	45/57	21/48.8	200/53.3
Total	253/100	79/100	43/100	375/100

Among AR patients, seasonal pattern was seen in 32% of the patients, perennial pattern in 30%, perennial pattern with exacerbation in some seasons (mixed type) in 38% of the patients. Positive family history of atopy was seen in 72% of the patients (overall). 35.20% of the cases had eosinophil counts more than $350/\text{mm}^3$ and 54.10% had a total IgE of more than 100IU/ml. In skin prick test, 156 (41.5%) had positive SPT to at least one or more of the aeroallergens. Percent positive cases among asthma patients were *D.f.* (26.6%), *D.p.* (26.6%), cockroaches (12.7%), feather (16.5%) and other aeroallergens less than 5 percent. In AR, cases percent positive ones included *D.f.* (22.9%), *D.p.* (25.3%), cockroaches (17.4%), feather (4.7%) and other aeroallergens were positive from

zero to 5.9 percent. In addition, in the combination of both asthma and AR cases, % positive ones were: *D.f.*, 32.6%; *D.p.*, 23.3%; cockroaches, 11.6%; feather, 7.0; and other aeroallergens from 1 to 5 percent. Frequency of positive tests for individual allergens, IgE level and eosinophil counts are shown in Table 2.

Table 2. Distribution of aeroallergen-positive skin prick tests, IgE and eosinophil counts in patients with allergic rhinitis, asthma and a combination of both (n=375).

Allergen	AR (n/%)	asthma (n/%)	both (n/%)	total(n/%)
<i>D. f</i> *	58/ 22.9	21/26.6	14/32.6	93/24.8
<i>D. p</i>	64/25.3	21/26.6	10/23.3	95/25.3
Cockroach	44/17.4	10/12.7	5/10.9	59/15.7
Feather	12/4.7	13/16.5	3/7	28/7.5
Aspergillus	7/2.8	0/0	2/4.7	9/2.4
Alternaria	4 /1.6	5/6.1	5/10.9	14/3.6
Nettle	6/2.4	1/1.3	1/2.3	8/2.1
Pigweed	15/5.9	0/0	3/7	18/4.8
Oak	0/0	0/0	1/2.3	1/0.3
Maple	9/3.6	0/0	2/4.7	11/2.9
IgE	134/53	43/54.4	26/60.5	203/54.1
Eosinophil	84/33.2	32/45.5	16/37.2	132/35.2

D. f : *Dermatophagoides farinae*

D. p: *Dermatophagoides pteronyssinus*

In asthmatic patients cough was the most common symptom (74.7%) followed by dyspnea and wheezing. In AR, nasal discharge was the most common symptom (68%) followed by sneezing, pruritus and congestion (Table 3).

Serum IgE greater than 100 IU/ml and family history of atopy are among risk factors for the development of allergic diseases. Among the studied patients 72% of patients had positive family history of atopy and 54.10% had IgE level of more than 100 IU/ml.

Table 3. Clinical symptoms in patients with allergic rhinitis, asthma and a combination of both (total=375).

Symptoms	AR (n/%)	asthma (n/%)	both (n/%)	total (n/%)
Cough	16/6.3	59/74.7	38/88.4	113/30.13
Dyspnea	-	39/49.4	27/62.8	66/17.6
Wheezing	-	39/49.4	23/53.5	62/16.53
Sneezing	128/50.6	6/7.6	12/27.9	146/38.93
Nasal discharge	172/68	8/10.1	24/55.8	204/54.4
Nasal pruritus	121/47.8	7/8.9	24/55.8	152/40.53
Nasal congestion	124/49	4/5.1	18/41.9	146/38.93

DISCUSSION

The symptoms of AR are nasal discharge, sneezing, itchy and stuffy nose. Other nasal diseases including chronic sinusitis, nasal polyposis, atrophic rhinitis, deviated nasal septum, nasal tumors, occupational rhinitis, aspirin sensitivity, endocrine disease, pregnancy, and drug-induced rhinitis can give rise to similar symptoms. Careful history taking and nasal examination should rule out the latter non-allergic nasal diseases. The diagnosis of AR can be done after investigations to confirm the presence of an allergic reaction. The SPT is the recommended initial investigation for this purpose (1). However, testing with aeroallergens perceived to be important in the community may be a self-fulfilling prophecy. Such a practice is based on the background information provided by previous investigations conducted in the region, but not all relevant aeroallergens might have been included.

Aeroallergens are the prominent causes of allergic symptoms in patients with asthma or AR. In this study, 156(41.50%) of patients were sensitive to aeroallergen but many of these patients had negative skin prick test, in spite of the classical clinical findings of AR or asthma. Local generation of IgE provides an explanation for this group. Overall, in this study, indoor allergens such as *D.f.* and *D.p.* were the most common aeroallergens in patients with allergic diseases in Sari. Cockroaches and feather were next in importance, because cockroaches are present everywhere and the feather is used more commonly in Iranian homes. Among fungi, aspergillus and Alternaria had the same percentage of positivity as pollens and trees. Among trees and grasses, pigweed, oak, maple and nettle were next in importance. The UK postal survey found a prevalence of perennial diseases of 21 %(9) but in our study, we selected 43 patients (11.46%) who had bronchial asthma together with allergic rhinitis. In this study, among allergic rhinitis group, 81(32%) of the patients had seasonal pattern, 76(30%) had perennial patterns and 96(38 %) had a mixed pattern. Therefore, a mixed pattern was the most common type and might be due to the effects of indoor and outdoor allergens in this area. The most frequent aeroallergen causing a positive reaction to the SPT in this group (AR) was house dust mites (*D.p.* and *D.f.*). In a similar study in Shiraz, Tehran and Karaj (Iran), pollen allergens from weeds, grasses and trees were the most common aeroallergens in patients with allergic rhinitis (10-12). In United Arab Emirates, the most common reactions were from mesquite, grass mix, cotton wood, Bermuda grass, kocki, acacia, alfalfa, chenopodium, date palm, cockroaches, and house dust mite (13). Based on our knowledge about dry climate and the regional herbal geography, these results were expected. In contrast, house dust mites were reported to have the highest rate of sensitization among Malaysian asthmatic patients (14) and patients with AR in Thailand (15), Singapore (16) and Mexico City (17). This difference was also expected since mite tends to require high humidity and moderate temperature to thrive and Sari has a humid climate. In addition, *D.f.* and *D.p.* allergens followed by cockroach allergen were more common in asthmatic and in both asthmatic and allergic rhinitis groups (Tables 2). This is also due to the high humidity and warm climate of Sari in northern Iran. Similar results are obtained in other countries with the same climate (11-14). Indoor allergens such as mites (*D.f.*, *D.p.*) and cockroaches are the major aeroallergens in Sari. High prevalence of skin reactivity to mites and cockroaches demonstrates the variation in the prevalence of aeroallergen reactivities in different regions with different climates. This is in agreement with the work of Sattar in Qatar, who showed that *D.P.*,

D.F. and cockroaches were more common in asthmatic patients (41.6, 36.9 and 32.2 percent, respectively) (18). Similar to our study, *D.f.*, *D.p.* and *Chenopod album* were more common in Almogren's study in Saudi Arabia (19). As shown in this study, allergen SPT reactivity is low in younger age group, increases in the middle age group and then tends to decrease with advancing age (20).

In Conclusion, the most common aeroallergen-hypersensitivity was provided by house dust mites in the studied population, followed by cockroaches and feather. Sensitization to outdoor allergens appears to be less common among this group of Iranian patients. Measures of asthmatic, allergic rhinitis and their combination must be taken to avoid or reduce their exposure to aeroallergens to which they have been sensitized.

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