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Assessment of Sensitization to Insect Aeroallergens among Patients with Allergic Rhinitis in Yazd City, Iran

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ABSTRACT

The frequency of allergic diseases such as allergic rhinitis is considerable in general population. Insect aeroallergens are important allergens which can induce airway inflammation. The aim of this study was to determine the prevalence of sensitization to insect aeroallergens in allergic rhinitis patients in Yazd as a desert city in Iran.

A cross-sectional study was undertaken on 95 allergic rhinitis patients who were referred to allergy clinic of Yazd city. Skin prick tests (SPT) by standard extracts of three insect aeroallergens including Mosquito, Corn moth, Cockroach and two species of mites as common aeroallergens in allergic rhinitis (Dermatophagoid Farina, Dermatophagoid Peteronysinus) were done.

SPT results showed that the most common insect aeroallergens were: mosquito (32.6%) followed by corn moth (26.3%) and cockroach (13.7%).The prevalence of SPT positive response to Dermatophagoid Peteronysinus, Dermatophagoid Farina were 8.4% and 7.4%, respectively. These results demonstrated that sensitization to insect aeroallergens was significantly more common compared to mites in patients with allergic rhinitis in Yazd city, a city surrounded by deserts.

High prevalence of skin reactivity to mosquito and corn moth as insect aeroallergens in Yazd city with hot and dry climate in contrast to humid regions such as north of Iran, where mites are more frequent, indicates differences in the prevalence of aeroallergen reactivity in various areas with different climates. Our study could highlight the importance of insect aeroallergens for clinicians for better diagnosis and management of patients with allergic rhinitis.

Keywords: Allergic rhinitis; Insect aeroallergens; Skin prick test (SPT)

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INTRODUCTION

Allergic rhinitis is a prevalent disease and it can affect nearly 25% of the population. The frequency of allergic rhinitis has been increased over the last decades. Allergic rhinitis affects the patients' quality of life and is a global health problem. Symptoms of allergic rhinitis are rhinorrhea, nasal obstruction, nasal itching and sneezing which are induced by IgE-mediated reaction after allergen exposure.[1,2]

Aeroallergens with an origin from plants, animals and house dust mites are common allergens involved in allergic rhinitis. Several researches have determined the aeroallergens affecting patients with allergic rhinitis.[3,4]

Arthropods such as mites and insects are recognized as important sources of aeroallergens.[4] Cockroach as an insect aeroallergen have long been known to induce allergic reactions.[5-7]

In this study we evaluated 2 classes of arthropods as indoor allergens: Insects (mosquito, corn moth and Blatella germanica) and Arachnida (Dermatophagoides pteronyssinus and Dermatophagoides farina).

Yazd is a desert city located in center of Iran. Location of Yazd province in map of Iran has been shown in figure 1. The climate of Yazd city is dry and hot and this climate can limit the growth of molds and house dust mites.[8]

The present investigation was undertaken in patients with allergic rhinitis in Yazd city of Iran to assess the sensitization to insect aeroallergens comparing with sensitization to mites as common aeroallergens in allergic rhinitis.

Figure 1. Location of Yazd province in map of Iran

MATERIALS AND METHODS

Ninety five patients with a diagnosis of allergic rhinitis participated in this cross-sectional study.

Allergic rhinitis was diagnosed and graded based on the criteria of ARIA [8] in patients who referred to Yazd outpatient allergy clinic during the years 2007-2009.

A questionnaire including demographic data was completed for each patient. The allergy testing method used for this study was skin prick testing (SPT). The allergens manufactured by Stallergen France were used.

All participants underwent SPT with a panel of 3 insect aeroallergens including mosquito, corn moth, cockroach and 2 species of mites including Dermatophagoid farina (DF), Dermatophagoid peteronysinus (DP). Also Histamine as positive control (1mg/ml) and normal saline as negative control were used. the results were read 15 minutes later: a wheal diameter of at least 3 mm greater than the negative control test with flare of any size, or a wheal with a diameter of less than 3 mm and a flare with a mean diameter of at least 10 mm was considered positive. [9]

The SPSS statistical software was used for data entry and analysis. The chi-square statistics and Independent-Samples T Test were used to test for comparison of proportions. Statistical significance was defined when the *p* value was less than 0.05.

All protocols were reviewed and approved by the local research and ethics committees. The participants provided their signed informed consent before inclusion in the study.

RESULTS

Ninety five patients with allergic rhinitis, aged between 10 months and 59 years (mean±SD: 22.75±14.72) were included in this study. There were 42 (44.2%) females and 53 (55.8%) males; the male/female ratio was 1.26.

Positive family history of atopy was reported in 48 (50.5%) patients.

Skin Prick Test (SPT)

Out of the 95 patients, 43 (45.3%) cases showed positive SPT to at least one aeroallergen. SPT results showed that 31 (32.6%) patients reacted to mosquito, 25 (26.3%) to corn moth and 13 (13.7%) to cockroach. Sensitization to the house-dust mites was less frequent:

the results of Dermatophagoid peteronysinus was 8 (8.4%) and Dermatophagoid farina was 7 (7.4%). The overall rate of sensitization to mites was 9.5%. Furthermore, the frequency of sensitization to other insect aeroallergens (41 of 43) was significantly more than mites (9 of 43) in patients with allergic rhinitis (p=0.028).

The frequency of positive tests to individual insect aeroallergens and mites in 95 patients with allergic rhinitis is depicted in figure 2. The most common indoor aeroallergen in patients in our study was mosquito as an insect aeroallergen.

Nineteen (44.2 %) of patients were sensitized to 1 aeroallergen, while 16 (37.2%) of patients were sensitized to 2 aeroallergens, 4 (9.3%) of patients were sensitized to 3 aeroallergens and 1 (2.3%) of patients was sensitized to 4 aeroallergens and 3 (7%) of patients were sensitized to 5 aeroallergens according to SPT results. The polysensitization rate to insect aeroallergens and mites among allergic rhinitis patients was 55.8%.

The proportion of female patients with positive SPT was 17 of 42 (40.5%) which was not significantly different from that of male patients with a result of 26 of 53 (49%). Also there was no significant difference in frequency of sensitization to each aeroallergen between both sexes (p>0.05).

In patients with allergic rhinitis, 19 patients had positive SPT to only one aeroallergen (44%). Sixteen patients had two positive SPT results (37%) and the reminder (19%) had positive result to more than two allergens.

Table 1. Prevalence of positive SPT to aeroallergens in patients (n=86).

Age group n=86	mosquito	corn moth	cockroach	Dermatophagoid peteronysinus	Dermatophagoid farina
Children n=31	10 (32.2%)	6 (19.3%)	6 (19.3%)	1 (3.2%)	2 (6.4%)
Adults n=55	17 (30.9%)	16 (29%)	7 (12.7%)	6 (10.9%)	4 (7.2%)
P value	NS	NS	NS	NS	NS

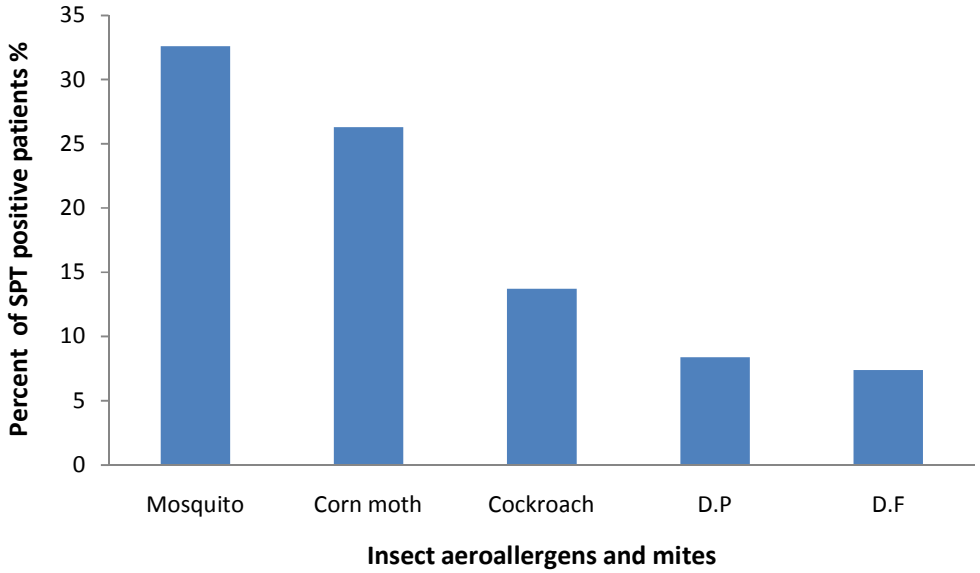

Figure 2. Results of SPT with three insect aeroallergens and mites in patients with allergic rhinitis in Yazd city

Table 2. SPT results to five aeroallergens and association of them with disease severity

SPT result	Mild Intermittent n=2	Mild Persistent n=19	Moderate Intermittent n=46	Moderate Persistent n=28	P.value
Positive to at least one of five aeroallergens	1	6	21 (45.6%)	15 (53.5%)	0.091
Negative SPT	1	13 (68.4%)	25 (54.3%)	13 (46.4%)	

We divided patients in two age groups, children: 0-18 years (n=31) and adults: 18-59 years. Mean age of children was 7.1±4.35 and male/female ratio was 5/2. Mean age of adults was 31.58 ± 10.51 and male/female ratio was 10/6.

Thirty-nine % of patients with positive SPTs were in age group of 0-18 years and 60.5 % were older than 18 years.

The frequency of positive SPT was not significantly different between the two age groups of allergic rhinitis patients (p=0.67) and also difference in frequency of sensitization to each aeroallergen in two age groups was not significant (p>0.05).

In bothage groups, mosquito and corn moth were the most common aeroallegens followed by cockroach and mites (Table 1).

Clinical Severity

The grading of severity of allergic rhinitis in our patients showed that the number of patients with moderate persistent, moderate intermittent, mild persistent and mild intermittent allergic rhinitis were 28 (29.5%), 46 (48.4%), 19 (20%) and 2 (2.1%), respectively.

There was no significant difference in clinical severity between the SPT-positive and SPT-negative patients (Table 1). However, sensitization to corn moth was significantly more frequent (42.8%) in persistent moderate allergic rhinitis patients compared to less severe diseases (p=0.01).

The frequency of positive SPT to aeroallergens in clinical grades of allergic rhinitis is shown in Table 2.

DISCUSSION

This study has shown that insect aeroallergens are important and frequent sensitizing aeroallergens in patients with allergic rhinitis in Yazd city. Also the sensitization to insect aeroallergens was significantly more frequent compared to mites, 43.1% versus 9.5% in patients with allergic rhinitis (p=0.028).

Mosquito and corn moth are common sensitizing aeroallergens as indoor allergens in patients with allergic rhinitis in Yazd city. The rate of sensitization to mosquito 32.6% and Corn moth 26.3% was more than that of Cockroach 13.7% and Mites 9.5%. In contrast, high frequency of house dust mite contamination was found in the north of Iran with high humidity.[10] According to the study of Ghaffari et al, the rate of sensitization to DP and DF in patients with allergic rhinitis were 25.3% and 22.9%, respectively, which indicates that hypersensitivity to house dust mites in north of Iran is very common.[11] Also Mesdaghi et al reported that among 116 patients with allergic rhinitis in Tehran, positive SPTs for DP and DF were found to be 25% and 24.1%, respectively.[5] According to the results of studies in other countries, house dust mite in Thailand[12] and china[13] was reported to have the highest rate of sensitization in patients with allergic rhinitis. These differences was expected since mites grow in areas with high humidity and moderate temperature,[8] while Yazd city has a dry and hot climate .

In Al-Ain in United Arab Emirates the prevalence rate of sensitization to cockroach and dust mite was reported less than other aeroallergens which were 14.7% and 9.5%, respectively. Considering similar climate and ecology in Al-Ain and Yazd as desert cities, these results are reasonable.[14]

Cockroach has been known as an important aeroallergen.[15] Farhoudi et al reported that SPT reactivity to cockroach is 29% in children with asthma in Tehran[6] which is about two-fold more than the rate of cockroach sensitization in our study. Allergy to cockroach is common in urban areas with high level of infestation;[7] as Tehran has more high-rise buildings and urban settings than Yazd, these differences also is expected. In this study, positive SPT for cockroach was 13.7% which was more than reports from Bangladesh

(6.5%),[16] Malaysia (7.9%)[17] and less than USA (43,5%),[18] Nigeria(44.6%),[19] Kuwait (48.2%)[20] in allergic rhinitis and/or asthmatic patients.

In Japan, the frequency of specific IgE positivity to moth in patients with allergic rhinitis was 32.5%.[21] In USA, allergy to moth and mosquito in allergic patients was 39.5% and 22.5%, respectively.[22] The positive SPT to flour moth in baker apprentices in Denmark was 9.6%.[23] Also allergy to bee moth has been reported in fishers.[24,25]

This study showed that insect aeroallergens particularly mosquito and corn moth are causing concern but there is few data about allergy to mosquito and corn moth in literature.[15] However, allergy to cockroach as an insect aeroallergen have been investigated in many studies and it has been known as an important indoor allergen.[5-7,20,26] Regarding these results, we suggest more attention to sensitization to insect aeroallergens .

There is clinical association between moderate persistent allergic rhinitis and positive SPT to corn moth. This finding was similar to the study by Mesdaghi et al,[5] which showed that more severe asthma was seen in children with cockroach allergy. Therefore physicians should train allergic rhinitis patients especially those who suffer from persistent moderate allergic rhinitis about the way to avoid corn moth in their living areas.

There was no significant differences in sensitization to each insect aeroallergen and mite between females and males, however, Mesdaghi and Mugan studies showed that cockroach allergy was more prevalent among females compared to males. [5,26]

The frequency of positive SPT was not significantly different between the two age groups of allergic rhinitis patients. However, Exposure to indoor allergens frequently occurs in infants and young children with allergic respiratory diseases.[6,27]

Although we could not find significant difference in SPT reactivity between the two age groups and both sexes, there should be more concern to indoor allergens including insect aeroallergens in Iranian women and children since they spend most of their time in indoor places.[5,6]

Family history of atopy is a known risk factor for development of allergic rhinitis.[8] In our study, 48 (50.5 %) of patients had positive family history of atopy.

In conclusion, insect aeroallergens are important aeroallergens provocating allergic rhinitis in Yazd city. It seems reasonable to include insect aeroallergens such as mosquito and corn moth in the routine panel of diagnostic tests in this similar geographic area and other regions with similar characteristics. Also as a first step in treatment of allergy (allergen avoidance), some guides should be available for patients with allergic rhinitis about how insect aeroallergens could be eliminated.

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