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# Prevalence of aeroallergens sensitivity in asthmatic patients from Ahvaz

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## Abstract

**Background:** Asthma is a chronic inflammatory disease of the airways which is associated with the triad of cough, wheezing and dyspnea. Different allergens can cause allergic symptoms. Identification of allergens was essential in each region for the prevention and treatment of allergic diseases. The purpose of this study was to determine sensitivity to common aeroallergens by skin prick test.

**Material and methods:** In this cross sectional study, 111 volunteers with the sign and symptoms of allergic diseases who referred to Ahvaz Jahad-e-daneshgahi polyclinic during 2010-2011 were investigated. All patients were subjected to skin prick test with 24 common allergenic extracts. Data were analyzed by SPSS-18 software using Chi square test.

**Results:** Ninety nine patients (89.2%) had positive skin test to at least one of the aeroallergens. Common outdoor allergens (88%) were higher than indoor allergens (73%). Outdoor allergens with lots of weeds (86%) were the most common allergens. And also among the weeds, *Salsola kali* were the highest frequency (86.2%); and among the indoor allergen, mites were the highest frequency (40.8%). The average concentration of total serum IgE levels in patients with positive reactions was 156 IU / ml.

**Conclusion:** Weeds and mites were the most common cause of asthmatic diseases in Ahvaz. Identifying and determining the most common allergens in the region can provide the necessary recommendations to Patients took an important step in controlling and preventing disease.

**Keyword:** asthma, skin prick test, allergen.

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## Introduction

Asthma is a chronic airways inflammatory disease which clinically emerges as shortness of breath attacks, coughing and wheezing that causes of the airway hypersensitivity, mucosal edema and mucus production(1). Asthma is one of the most common chronic diseases in the world that currently about 300 million people are involved with the disease (2). Air pollution, allergens, occupational agents, viral infections and the others factors are included as asthma triggers. Inhaled irritants are the most common allergens for the asthma that are accounted as the allergens involved in sensitization. In addition, contact with the mite in household dust, especially in early childhood is also responsible for asthma production and is considered as one of the most sensitive allergen risk factors in asthma creation (3). Contact with airborne allergens inside and outside of the houses significantly increases the risk of asthma symptoms in patients. These allergens include mites, pollen, tree pollens, molds and the skin and dander of animals (4, 5). Given the trend of the air pollution in the region and increasing prevalence of allergic diseases, these days the number of patients with asthma is continuously rising. The asthma's annoying side effects and important symptoms, the high medical costs as well as the significant reduction in the quality of life caused by the disease making the necessity of the identification of the common allergens in order to establish the prevention steps and proper treatment regimen for the control of the illness. In the major industrial Ahvaz metropolitan, which the weather is hot and dry, and recently due to emissions of fine particles in the atmosphere, air pollution has increased and created many problems for the Ahvaz inhabitants. Detailed information on common allergens is not available in this area. Caring and controlling the allergic diseases are subject to recognition of the aggravating factors and allergen agents. Furthermore, the identified aggravating asthma allergens in this region may provide the fertile ground for prevention, diagnosis and proper treatment of the disease. Therefore, this study was designed and implemented to investigate the prevalence of common allergens in asthmatic patients from the Ahvaz metropolitan.

## Material and methods

The study was carried out on the patients with asthma from Ahvaz JundiShapur University of Medical Sciences during 2010-2011. In this study in order to evaluate the allergic reactions caused by various allergen agents the patients with asthma were included for a one year period from April 2010 to March 2011. The patients were selected through a distributed notice across the city inviting the people with asthma and allergies to allergens agents. Afterwards, the patients who might wish to check and determine the type of sensitivity to the specific allergen agent may refer to the University Jihad Clinic. The referred people were the patients who were admitted with symptoms of asthma disease who had previously been approved by the doctor and the doctor regularly prescribed the related drug for treatment of their disease. However, if necessary, the patients were again examined on-site by the physician to confirm their asthma disease. Subsequently, the specialist in immunology recorded the demographic characteristics such as age, gender and other related information. The immunologist also completed a description of the patient and the family history using special forms for the signs and symptoms of asthma in people as well as the drugs and types of used drugs. If the risk of asthma based on the standard criteria was confirmed by a physician, the skin prick test was performed on the patient's forearm to detect and confirm the illness. If that was the case of the positive skin prick test to at least one allergen, 5 ml of the patient

blood for the measurement of total IgE was obtained and the patient's serum was preserved at - 20 ° C until testing was performed. People who have been identified with no asthma at the time of interview or who had a history of drug used were excluded from the study. Before participating in the study, patients were asked to sign a consent form agreeing to cooperate with the plan. On all patients, skin prick tests were applied with extracts made by American Hollister-stir Company. The applied allergens in this study were selected based on the plant species found in the region. A total of 24 allergen agents were investigated. The outdoor allergens included a group of weed and grasses' pollen and trees pollens; the indoors' allergens included mites, fungi and the cockroaches. Histamine as a positive control and glycerin were used as negative controls. The studied extracts of allergens were placed on the anterior surface of the forearm and skin prick method was applied to insert the allergen into the patient's skin epidermis. Skin redness and swelling of the skin reactions were recorded after 15 minutes. The inflation equal to or more than 3 mm greater than the negative control was considered as positive skin reaction. A commercial enzyme immunoassay kit (ELISA) made by DIAPLUS Company from Canada was used to measure the total IgE levels in patients' serum samples. The total IgE serum levels were calculated according to the kit manufacturer's instructions. Using the kit the possibility of an allergy for samples are very high with IgE levels more than100 IU/ml. The collected data were analyzed using SPSS-18 software. The descriptive analysis of the main parameters such as frequency and mean were applied. In addition, for statistical analysis chi-square test and t-test were used to compare variables.

## Results

In this study, 111 patients (51.5 % males and 48.6 % female) were studied with asthma. Mean age was 30.7 ± 14.7 years, with a minimum of 4 and maximum of 66 years old. Of these, 34 were employees (30.6 %), 31 patients (27.9 %) were students, 31 (27.9 %) housewives, 12 (10.8 %) of businesses and 3 (2.7 percent) were unemployed. In addition, family histories for allergic diseases were also documented at 59.5 % for the members of the immediate family. The most common symptoms of patients included dyspnea (83.8 %), and wheezing (76.6 percent), sputum (63.1percent), cough (13.5 percent), runny nose (77.5 percent), frequent sneezing (78.5 percent), nasal itching (64.9 percent), red eye (36%) and urticaria (42.3 percent). A total of 64 patients (57.7 %) announced that the air pollution was as the most important factor in aggravating the symptoms of allergic. A number of 11 contributors (9.9%) in response to the question "Where will trigger your allergy symptoms?" answered that the inside the home, and 21 (18.9 percent) outside the home, while 77 patients (69.4 %) declared that the both locations were blamed in the incidence of allergic manifestations. The total of 109 (98.2 %) of patients reported that they applied the medicines especially oral medications to improve the symptoms of asthma.

Amount of 99 patients (89.2 %) had a positive skin test to at least one of the studied allergens whereas, 12 patients (10.8 percent) had a negative reaction against the allergens. The frequent distribution of specific skin reaction to the allergens is shown in Figure 1. Most of the positive skin reaction for the indoor allergens was observed for the mites (40.8 %) and the highest proportion of positive skin reactions to outdoor allergens was reported for the weeds (57.9 %), respectively. The highest prevalence of positive skin reaction was recorded for *Alternaria* fungi allergens with 18.9 % frequency however; the lowest percentage was related to the mixed molds with a frequency of 9 percent. Among the weeds

the most common prevalence was documented for *Salsola kali* and *Chenopodium album* with 70.3 % and the lowest frequency of 29.7 % for *Lolium perenne*, respectively. In the studied population, the highest and the lowest prevalence of positive skin reactions were documented for the *Mesquite* and *Eucalyptus* tree pollens, with a frequency of 63.1 %, and 18.9 percent, respectively. Furthermore, the skin reactivity to mixed cockroach extract was positive in 37.8 % of patients (Table 2). Overall, in no cases a significant statistically difference was observed for the prevalence of positive skin reactions in men and women. The frequency of positive skin reactions was evidenced in male 91.2 % and 87% in women, respectively (p = 0.343). Prevalence of positive skin reactions for outdoors allergens in males (84.2 percent) was higher than the women (74.1 %), respectively (p = 0.139). While, on the contrary, this rate for the indoor allergens in women (74.1 percent) was more than men (57.9 %), respectively (p = 0.055). The prevalence of positive prick reactions was significantly associated with age feature. So that, the prevalence of allergens rates in the age group of 15 to 35 years was significantly higher than the other two groups (P = 0.012). The average concentration of the total serum IgE levels in studied patients was 176 ± 163.4 IU / ml. The serum IgE level in 56 percent of patients was higher than 100 IU / ml. The average total serum IgE levels in men were more than women (168.14 vs. 144.67) however, this difference was not statistically significant (P = 0.45). Although, the total serum IgE levels increased with age (Table 2), but the mean total serum IgE levels in the age groups was not statistically significant (P = 0.344).

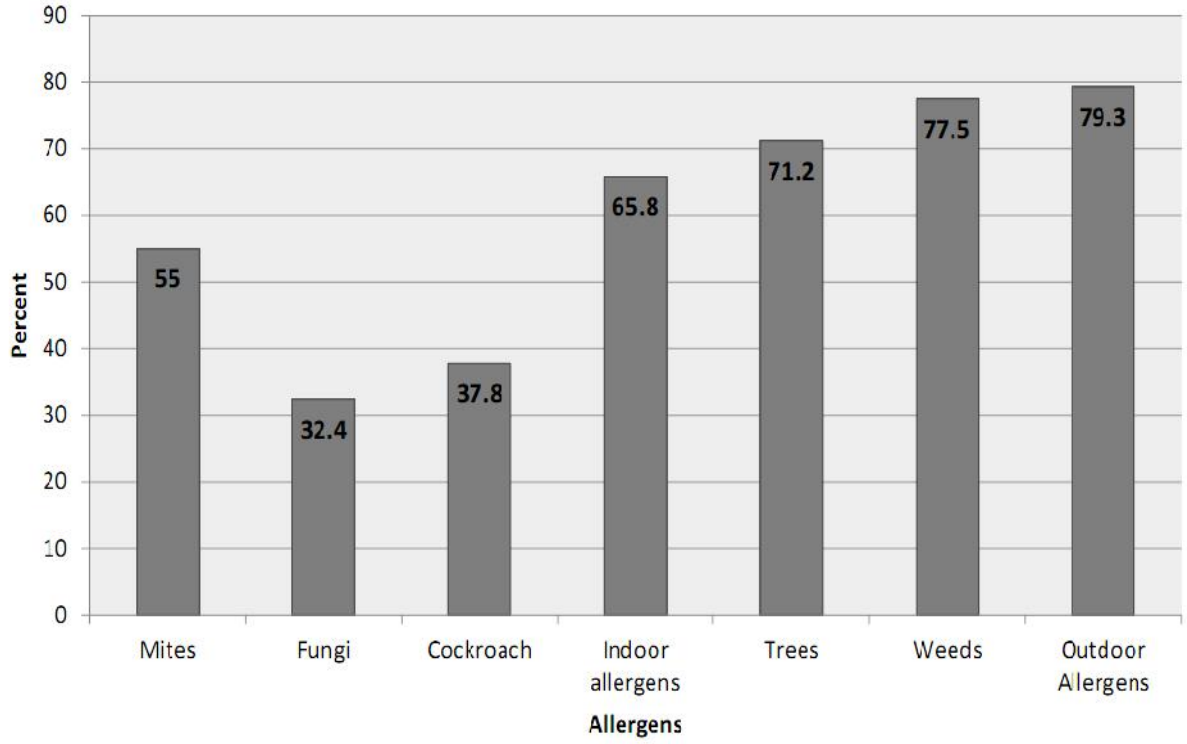
**Table 1: Frequency of positive skin reactions in patients with asthma according age and gender**

| Various factors | Positive cases. Frequency (%) | Negative cases. Frequency (%) |
|---|---|---|
| • Age | | |
| Under 15 years | 18 (90%) | 2 (10%) |
| 15 to 35 years | 48 (98%) | 1 (2%) |
| Above 35 years | 33 (78.6%) | 9 (21.4%) |
| • Gender | | |
| Male | 52 (91.2%) | 5 (8/8%) |
| Female | 47 (87%) | 7 (13%) |
| The total studied population | 99 (89.2%) | 12 (10.8%) |

**Table 2: Frequency (%) of the sensitivity to various allergens in patients with asthma according gender and age groups**

| Allergens | All studied patients n=111 | Ages | | | Gender | |
|---|---|---|---|---|---|---|
| | | 15 ≤ n=20 | 15-35 n=49 | 35≥ n=42 | Male n=57 | Female n=54 |
| Indoor Allergens | 73 | 55 | 79.6 | 54.8 | 57.9 | 74.1 |
| Mites | 61 | 45 | 63.3 | 50 | 49.1 | 61.1 |
| Fungi | 36 | 30 | 38.8 | 26.2 | 36.8 | 27.8 |
| Cockroaches | 42 | 30 | 53.1 | 23.8 | 40.4 | 35.2 |
| Outdoor Allergens | 88 | 70 | 87.8 | 73.2 | 84.2 | 74.1 |
| Trees | 79 | 55 | 79.6 | 69 | 71.9 | 70.4 |
| Weeds | 86 | 70 | 83.7 | 73.8 | 84.2 | 70.4 |
| Total Patients | 111 | 90 | 98 | 78.6 | 91.2 | 87 |
| Average Total Serum IgE | 156 | 114.9 | 153.5 | 180.4 | 168.1 | 144.7 |

**Figure 1: Frequency of the allergens in the studied population from Ahwaz**




## Discussion

This study has been carried out on the patients with asthma from Ahwaz to examine the prevalence of sensitization to allergens triggers producing allergic symptoms. The findings showed that 89.2 percent of patients had a positive skin test to at least one of the respiratory allergens. The frequency in similar studies from Mashhad and Karaj was 70 and 80 percent, respectively (1, 6). It seems that the high prevalence of asthma in the Ahvaz region (7) in most of these patients was due to the air pollution in terms of the great quantity of fine particles in the studied region. In a

study in the city of Jeddah in Saudi Arabia on 151 asthmatic patients, 113 (74.8 percent) had a positive skin reaction (8). Results extracted in another study from Nigeria which was conducted on 221 patients with asthma has reported a positive skin reaction for the 76% of the patients (9). Furthermore, results of a study to determine the prevalence of various allergens in Kuwait with specific measurements on the serum of 553 patients with asthma showed that 87.2 % of the serum samples of individuals had specific antibodies IgE against at least an allergen (10). Sensitivity to different allergens in another study conducted in Indonesia was reported the frequency of positive skin tests in 94 % of patients with asthma (11) which confirmed the relationship between the incidence of asthma symptoms and the allergenic agents. The observed differences in the frequency of positive skin tests in these studies could be due to the differences in climatic conditions, the type and number of allergens as well as the severity and type of underlying individuals' disease. Results extract from the current study showed that 84.2 % of patients were allergic to outdoor allergens. This frequency have been reported 87.1 percent from Kuwait (9), which can represent the climate akin to the area near Kuwait and Ahvaz and the large quantity of suspended dust particles that are constantly being released in the atmosphere. The results also showed that among the indoor allergens the mites incorporated the higher incidence rate as allergenic agents. In addition, in studies conducted in Zanjan (12), Tabriz (13), Mashhad (1), Kuwait (10) and the Qatar (14), the mites were also known for the most common allergens which were consistent with the current studied results. Thomas has reported in a study examining the role of indoor allergens in asthma that the mites were especially the most important allergen factors for this disease (15). The findings of two other studies in North America and Mexico have introduced the mites for the most abundant allergens that caused positive skin tests in asthmatic patients (16, 17), which is an indicative of the importance of these factors in asthma. Results from the current study showed that 42% of patients had positive skin reactions to cockroaches' allergens. Farhoodi studied the sensitivity of asthmatics to cockroach allergens in children from 6 months to 12 years old and reported a 29 % rate of positive skin tests in these children (18). Results of a study in northern Iran have also reported the prevalence of sensitivity to cockroach allergen in patients with asthma, 12.7 percent (19). In a study of 1041 children aged 5 to 12 years old with asthma; the prevalence of skin test to cockroach allergen was documented from 13.4 to 21.5 % (17). In the present study, no significant difference was observed for the skin prick test positivity between men and women. Although, the prevalence of indoor allergens in women was significantly higher than in men, and common outdoor allergens somewhat was higher in men than women however, the difference was not statistically significant. Given that men should generally spend more time outside the home than women, therefore, they are most in contact with outdoor allergens, and vice versa, the more attendance of women in the house is probably leading to more contact with indoor allergens which increase the women sensitivity against the indoor allergens. Results from a study in Shiraz showed a higher significant sensitivity among men than women (20). However, this difference was not significant for the results of studies from Zanjan (11), Semnan (21), Mashhad (22) and Tehran (23).

In terms of age groups, similar to other studies, the most common allergy was observed in the younger age groups. The present results showed that the difference for the incidence of allergies in the age group of 16-35 years was significantly higher than the other two age groups.

Results from a study in Zanjan showed that the sensitivity to grass in patients aged 20 and/or younger was significantly higher than other age groups (12). Results of a French study showed that regardless of the type of allergen, the skin reaction tests in patients aged 15 to 35 years was significantly higher than other age groups (24). The difference in the prevalence of positive skin reactions in different age groups could be due to differences in physical and occupational activity as well as the differences in the individuals' working and living environment. Other findings of the study indicated that the mean total serum IgE level in males was significantly higher than women. In some other studies, serum levels of IgE have been reported more in men than women (22 and 25).

After all, the results of this study were interestingly consistent with other similar studies in Iran and other countries with similar climatic conditions. Nevertheless, identification of common allergens in every area as a district priority could result in the production of the native allergen extracts which is useful in the diagnosis and treatment of patients. In Conclusion

The results of this study showed that 89.2 % of the studied cases indicated a positive skin test to at least one of the allergens and the weeds and the mites were the most common allergens producing the incidence and exacerbation of asthma symptoms in the region. Identification of the common allergens in the area and providing advices to the patients could help in the important steps for the control and prevention of the disease.

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