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Prevalence of Sensitization to Food and Inhalant Allergens in Patients with Atopic Dermatitis in Gorgan, North of Iran

Mohammad Sobhani Shahmirzadi[1], Jabbar Parhiz[1], Bagher Pahlavanzade[2], Masoud Mohammadi[3,4], Mohsen Ebraimi*[1]

1. Neonatal and Children's Health Research Center, Golestan University of Medical Sciences, Gorgan, Iran
2. Department of Biostatistics, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Golestan Research Center of Gastroenterology and Hepatology, Golestan University of Medical Sciences, Gorgan, Iran
4. Department of Medical Library & Information Sciences, Faculty of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran.

ABSTRACT

Background and objectives: Atopic dermatitis is a chronic inflammatory allergic disease that specifically affects the skin. The incidence of this disease is influenced by genetic and physical stimuli, hormones, stress and food and inhalant allergens. Given the increasing prevalence of atopic dermatitis, it is important to identify food and inhalant allergens associated with the disease. The purpose of this study was to evaluate prevalence of sensitization to food and inhalant allergens in children with atopic dermatitis.

Methods: This cross-sectional study was performed on 56 children (29 males and 27 females) with atopic dermatitis who were referred to the Dezyani Asthma and Allergy Clinic in Gorgan between 2016 and 2017. Atopic dermatitis was confirmed via the Prick test. Data were analyzed using SPSS 16 at a significant level of 0.05.

Results: Average age of the subjects was 4.26 ± 3.79 years. The most common inhalant allergens were mite (35.7%) and salt grass (3.6%) and the most common food allergens were egg white (35.7%) and cow's milk (26.8%).

Conclusion: Considering the high prevalence of food allergy in the studied population, it is necessary to reduce the severity of allergic reactions and its subsequent treatment costs by observing the principles of a healthy diet and lifestyle.

KEYWORDS: Atopic dermatitis; Inhalant allergen; Food allergen; Prick test

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***Correspondence:** Dr Mohsen Ebraimi,

Address: Neonatal and Children's Health Research Center, Golestan University of Medical Sciences, Gorgan, Iran

Telephone: +98-9113765214 **Email:** dr.ebrahimi2019@gmail.com

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INTRODUCTION

Atopic dermatitis or eczema is an inflammatory skin disorder characterized by severe itching, erythema, edema and flaking (1). The disease mostly appears in childhood and is recognized as the most common inflammatory skin disease in this period. People with a positive family history and other atopic disorders including asthma, allergic rhinitis and food allergy are more likely to develop the disease (2-4). The prevalence of atopic dermatitis in industrialized countries has increased over the past three decades. According to epidemiological studies, the disease affects 2-10% of adults and 5-30% of children (2, 4, 5). Genetic and environmental factors influence the incidence of atopic dermatitis. Children living in urban areas are more likely to develop allergic diseases. Exposure to pollutants and allergens in closed environments and reduced breastfeeding rates may be associated with the increased prevalence of this disease. Improving the health status of children and raising awareness about atopic dermatitis can be beneficial for controlling this disease (4).

Food allergy refers to an abnormal immune response to a certain food, regardless of the physiological effects of that type of food. Eggs, milk, peanut, wheat and soybean are among common food allergens. Food allergy in patients with atopic dermatitis is of clinical importance since it may interfere with the treatment process of the patients. Food allergy is observed in almost 30% of patients with atopic dermatitis, most of whom are children younger than 3 years of age. In the United States, about 6% of children and 3.7% of adults have food allergy. Food allergies are not diagnosed at the right time due to lack of specific symptoms (4).

Inhalant allergens such as house dust mite (HDM), grass, ragweed pollen, molds and animal- and bacteria-related allergens are responsible for skin and respiratory allergies in children and adults (6, 7). Various studies in Iran have investigated the prevalence of food and inhalant allergens in people with atopic dermatitis (1, 4, 8-11). Recent studies Have emphasized on the role of environmental factors such as air temperature, humidity, pollution and radiation intensity (12-15). Considering the environmental characteristics of Northern provinces of Iran, we aimed to determine the prevalence of sensitization to food and inhalant allergens in patients with atopic dermatitis in the Golestan Province, north of Iran.

MATERIALS AND METHODS

This cross-sectional study was conducted on patients with atopic dermatitis who were referred to the Dezyani Asthma and Allergy Clinic in Gorgan (Golestan Province, Iran) during 2016-17. Patients over 4 months of age who had not received anti-histamines and corticosteroids in the two weeks prior to the prick test, as well as those without dermatographism were included in the study. Individuals with a history of septic shock or heart attack, pregnant women and women with hereditary angioedema were excluded from the study.

Atopic dermatitis was diagnosed using the prick test in which histamine and physiological saline were used as the positive and negative controls, respectively. A raised bump (more than 3 mm) surrounded by a small circle of itchy red skin indicated a positive reaction. The test was done for 15 food allergens and 10 inhalant allergens. The allergen selection criterion was based on the availability of the extracts and high prevalence of allergens. Based on the comments of a pulmonologist and a clinical immunologist, and severity of asthma, the subjects were divided into three groups: mild asthma, moderate asthma and severe asthma.

Written consent was taken from parents of the subjects. Necessary information was extracted from the patients' medical records. Data were presented using descriptive statistics, such as mean, standard deviation (SD) and frequency. Comparison of sensitization to allergens between the groups was done using the Chi-square test and Fisher's exact test. This comparison was made for allergens with a prevalence of greater than four. All statistical

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analyses were performed in SPSS 16 at a significance level of 0.05.

RESULTS

Overall, 56 subjects (29 males and 27 females) with an average age of 4.26 ± 3.79 years were diagnosed with atopic dermatitis according to the prick test. Thirty-three (58.9%) subjects were living in urban areas and 23 subjects (41.1%) were living in rural areas. Moreover, 20 subjects (35.7%) had a history of allergic disease, of whom eight (40%) had asthma, six (30%) had food allergy, three (15%) had allergic rhinitis and three (15%) had hives.

Based on the severity of asthma, atopic dermatitis was classified as mild, moderate and severe in 41.1%, 53.6% and 5.4% of the subjects, respectively. The most common symptoms were dry skin (96.4%), erythema (58.9%), itching (51.8%), growth retardation (5.4%) and restlessness (3.6%) (Figure 1).

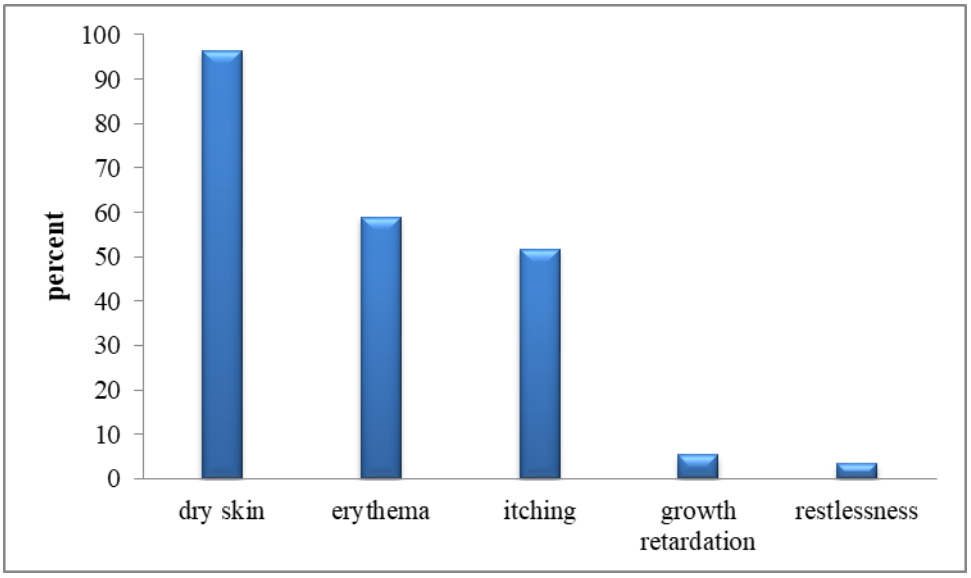

Figure 1. Distribution of clinical signs in patient with atopic dermatitis in Gorgan

Mite was the most common (35.7%) inhalant allergen, followed by weed (salt grass), beetles and dogs (Figure 2).

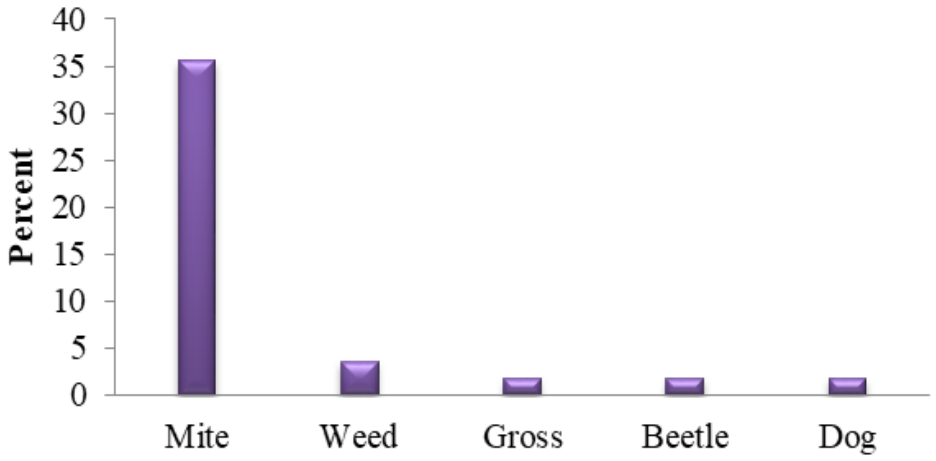

Figure 2. Distribution of sensitization to inhalant allergens in patients with atopic dermatitis in Gorgan

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The most common food allergens were egg white (35.7%), cow's milk (26.8%) and wheat (14.3%). Other food allergens were peanut butter, soybean, fish, walnut, beef, egg yolk, almond, strawberry, rice, hazelnut, tomato, banana and pistachio (Figure 3). Food allergies were about 3.5 times more prevalent that respiratory allergies.

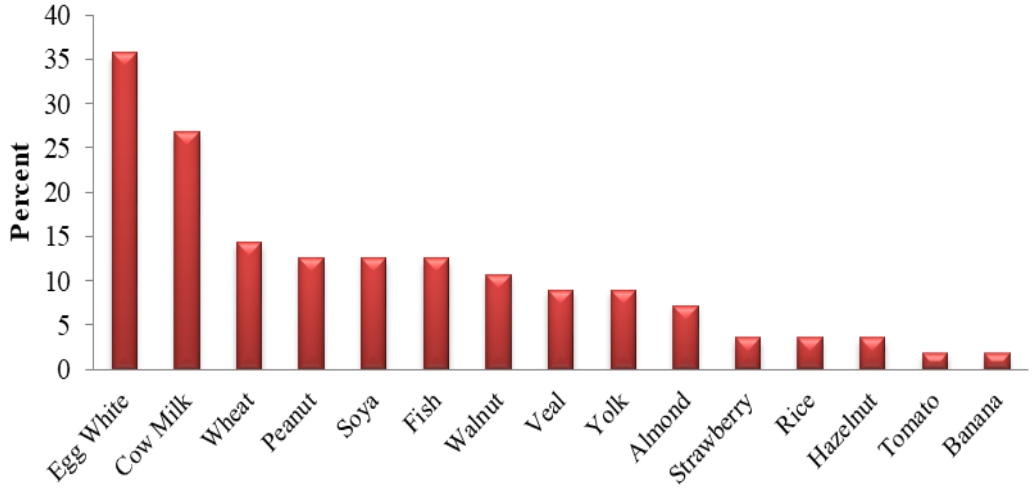

Figure 3. Distribution of sensitization to food allergens in patients with atopic dermatitis in Gorgan

When studying the association of allergies with age, we found that allergic reaction to mite was significantly more prevalence in children older than 3 years. Among food allergens, allergic reaction to egg white and cow's milk was significantly more prevalent in children aged ≤3 years, while allergy to almond was significantly more common in children older than 3 years (Table 1).

Table 1. Frequency of food and inhalant allergens in patients with atopic dermatitis based on age, gender and place of residence

		Gender			Age			Place of residence		
		Male	Female	P-value	≥3	<3	P-value	Urban	Rural	P-value
Food allergens	Egg white	10 (34%)	10 (37%)	0.89	15 (57%)	5 (16%)	0.002*	11 (37%)	9 (39%)	0.78
	Cow's milk	7 (24%)	8 (29%)	0.76	13 (50%)	2 (6.6%)	0.001*	9 (27%)	6 (26%)	1
	Wheat	3 (10%)	5 (18%)	0.46	6 (23%)	2 (6.6%)	0.12	4 (12%)	4 (17 %)	0.7
	Peanut	6 (20%)	1 (3.7%)	0.1	3 (11%)	4 (13%)	1	5 (15%)	2 (8.6%)	0.68
	Almond	3 (10%)	1 (3.7%)	0.61	0	4 (13%)	0.11	2 (6%)	2 (8.6%)	1
	Soya	2 (6.8%)	2 (7.4%)	1	3 (11%)	1 (3%)	0.32	3 (9%)	1 (4.3%)	0.63
	Fish	4 (13%)	3 (11%)	1	5 (14%)	3 (10%)	0.69	5 (15%)	2 (8.6%)	0.68
	Walnut	4 (13%)	1 (3.7%)	0.67	3 (11%)	3 (10%)	1	3 (9%)	3 (13%)	0.68
	Yolk	3 (10%)	2 (7.4%)	1	2 (7.6%)	3 (10%)	0.417	4 (12%)	1 (4.3%)	0.63
	Veal	2 (6.8%)	3 (11%)	0.66	5 (14%)	1 (3.3%)	0.17	2 (6%)	3 (13%)	0.39
	Strawberry	2 (6.8%)	0	0.49	0	2 (6.6%)	0.49	0	2 (8.6%)	0.16
	Rice	1 (3.4%)	1 (3.7%)	1	2 (7.6%)	0	0.21	2 (6%)	0	0.5
	Hazelnut	0 (0%)	3 (11%)	0.22	1 (3.8%)	1 (3.3%)	1	1 (3%)	1 (4.3%)	1
	Banana	1 (3.4%)	0	1	0	1 (3%)	1	1 (3%)	0	1
	Pistachios	1 (3.4%)	0	1	1 (3.8%)	0	1	1 (3%)	0	1
Inhalant allergens	Mite	11 (37%)	9 (33%)	0.78	5 (14 %)	13 (43%)	0.04*	14 (42%)	6 (26%)	0.26
	Beetle	1 (3.4%)	0	1	0	1 (3.3%)	1	1 (3%)	0	1
	Weed	1 (3.4%)	1 (3.7%)	1	0	2 (6.6%)	1	1 (3%)	1 (4.3%)	1
	Grass	1 (3.4%)	0	1	0	1 (3.3%)	1	0	1 (4.3%)	0.41

*Significant difference between the groups

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DISCUSSION

In this cross-sectional study, we evaluated the prevalence of allergic reactions to different food and inhalant allergens in patients with atopic dermatitis. Various studies have provided evidence of an association between the incidence of atopic dermatitis and allergies. For example, a study in Japan reported a significant relationship between atopic dermatitis and incidence of allergic rhinitis, bronchial asthma and food allergy, so that the age of onset of these conditions was significantly lower in those with atopic dermatitis (16). In a study by Onsori et al., 30% of patients with atopic dermatitis had food allergy, asthma, allergic rhinitis and hives (8). In our study, 35.7% of subjects with atopic dermatitis had asthma, food allergy, allergic rhinitis and hives. However, some studies have reported even higher prevalence rates for allergies among patients with atopic dermatitis. For instance, in a study by Fouladseresht, 59.2% of patients with atopic dermatitis reacted to at least one allergen (10). Röckman et al. reported the prevalence of food allergies to be 74.4% in patients with atopic dermatitis, of which 20.4% were asymptomatic (20). However, it has to be mentioned that this study has been carried out on adults, whilst our study subjects were children.

In a previous study in Iran, prevalence of respiratory and food allergies was 55.9% and 21.7%, respectively (10). However, in our study, the prevalence of respiratory and food allergies was 39.2% and 35.7%, respectively.

Egg yolk, egg white, peanut, walnut, soybean, cow's milk and curry powder have been reported as the most common food allergens (2, 4). In the present study, reaction to egg white and cow's milk was more common than other allergens. Similar to our findings, previous studies have reported HDM, salt grass, *Alternaria* spores, pigweed and spinach as the most common inhalants allergens (1, 9, 10).

In the present study, there was no correlation between incidence of food allergies and gender in patients with atopic dermatitis, which is in line with findings of Onsori et al. (8). However, in the study of Fouladseresht, the prevalence of allergies to beetle, egg yolk, egg white and tomato differed significantly between men and women (10).

According to Ahanchian et al., food allergies are more prevalent in younger individuals, while the prevalence of respiratory allergies is higher in older individuals (1), which is in line with our findings.

In a study in Poland, the prevalence of atopic dermatitis differed significantly between adults living in rural and urban areas, but no difference was found among children with atopic dermatitis (5). We also found no significant correlation between place of residence and incidence of atopic dermatitis in children.

The difference between results of the previous studies and our study could be attributed to climate and environmental factors (12-15). Given the importance of environmental factors on the incidence of atopic dermatitis, it is suggested to conduct studies on food and inhalant allergens in several provinces.

CONCLUSION

Considering the high prevalence of food allergy in the studied population, it is necessary to reduce the severity of allergic reactions and its subsequent treatment costs by observing the principles of a healthy diet and lifestyle.

DECLARATIONS

Funding

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Ethics approvals and consent to participate

Written consent was obtained from all participants. The study received approval from the Ethics Committee of Golestan University of Medical Sciences (ethics code: IR.goums.REC.1396.238).

Conflict of interest

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The authors declare that there is no conflict of interest regarding the publication of this article.

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