



ORIGINAL ARTICLE

Study of the Prevalence of Food Allergens in Patients with Allergies Admitted to Mofid Children's Hospital During 2010 to 2016

Fereshte Dehghan Banadaki¹, Mahboubeh Mansouri², Reza Shekarriz-Foumani^{3*}

¹School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Immunology and Allergy Department, Mofid Children's Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Department of Community Medicine, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author: Reza Shekarriz-Foumani, E-mail: reza.shekarriz@gmail.com

ARTICLE INFO

Article history

Received: Oct 09, 2017

Accepted: Dec 17, 2017

Published: Jun 13, 2018

Volume: 3

Issue: 2

Conflicts of interest: None

Funding: None

Key words

Allergic Diseases,

Food Allergens,

Skin Prick Test,

Children

ABSTRACT

Introduction: Allergic diseases include a wide range of symptoms such as asthma, rhinitis, urticaria, eczema, and gastrointestinal symptoms that are becoming increasingly prevalent in today's world. Exposure to food allergens is one of the contributing factors for allergic diseases in humans. The identification of susceptibility to food allergens plays an important role in the prevention and treatment of allergic diseases. **Materials and Methods:** After the clinical diagnosis of allergic diseases, patients were examined using the skin prick test. The method of collecting data was observational. All data were entered in SPSS software version 21 and analyzed using descriptive and inferential statistics. **Results:** A total of 466 patients with a mean age of years were studied, of which 58.6% were boys and 41.4% were girls. A total of 44.2% patients had asthma, 21.7% had allergic rhinitis, 2.1% had allergic sinusitis, 1.7% had conjunctivitis, 1.1% had angioedema, 11.6% had urticaria, 19.7% had eczema, and 26.8% had gastrointestinal allergic symptoms. A total of 114 patients (24.5%) had food allergies, of which 43.9% were girls and 56.1% were boys. In terms of the age and gender of patients, no statistically significant difference was observed between different food allergens ($P < .05$). The most common allergens in patients under study were peanuts (7.9%), milk (7.3%), almond (6.6%), freshwater fish (6.6%), and walnuts (6.4%). **Conclusion:** The findings revealed that allergen prevalence in each region is influenced by its climatic conditions, people's food habits, their racial differences, and their lifestyles.

INTRODUCTION

An allergy refers to an instant reaction of the immune system that occurs when the immune system responds to allergens that re-enter the body after it was already stimulated earlier by them(1). In recent years, for various reasons, different types of allergic diseases have spread throughout the world (2). After the re-entry of allergens into the body, the immune system responds to them and high levels of immunoglobulin E (IgE) are produced by B lymphocytes. IgE synthesis is because of immediate hypersensitivity as a result of Th2 cell activation and cytokine secretion of Interleukin (IL)-4, IL-5, IL-9 and IL-13. In allergic reactions, IL-4, which is a cytokine, plays an important role with its antitumor and anti-inflammatory effects, and immune responses are increased by IgE. Following the production of IgE, IL-4 is placed on mast cells and basophiles, and it binds with specialized receptors Fcε. If IL-4 is reconnected to the allergens, it activates them, causing the release of inflammatory mediators, which in turn gives rise

to the symptoms of allergy (3). A food allergy is an overreaction of human body to certain foods or substances that are usually safe. These adverse reactions may be hereditary or caused by a biochemical defect. Symptoms occur 1 to 2 hours after eating a particular food. Facial swelling, bloating and flatulence, diarrhea, abdominal pain, itching, swelling of the hands and feet, asthma, nausea and vomiting, cough, headache, and fainting or near-fainting condition are the symptoms of a food allergy(4). Food allergies are one of the most common types of allergic disorders. Adverse reaction to food is common in many developed countries. Recent data show that 6% to 8% of children in Western countries have food allergies, indicating that its incidence is increasing (5, 6). In children of lower ages, the most common food allergens include cow's milk (2.5%), eggs (1.3%), peanuts (0.8%), wheat (about 0.4%), soy (about 0.4 %), nuts (0.2%), fish (0.1%), and shellfish (0.1%). Children who develop allergies to milk, eggs, beans, and wheat in early childhood usually recover up to school age (about 80%) (7). Allergic diseases classified

on the types of symptoms include atopic dermatitis, allergic rhinitis, and asthma (8). Asthma is the most common chronic disease, that is, in fact, caused by chronic reversible airway obstruction. Its symptoms include coughing, shortness of breath, and wheezing. It can be seen at any age, but the peak incidence occurs at 3 years. This disease occurs twice as much in boys compared with girls during childhood. However, in adults, it is seen in both sexes equally (9). Allergic rhinitis is a common disease observed in different parts of the world (10). This disease has a prevalence of 10% to 40% in different age groups of the general population. Its clinical symptoms mainly and classically include sneezing, itching, and stuffy and runny nose (11). The cause of this disease is unknown, but factors such as hereditary and environmental factors are responsible for this disease. Allergic rhinitis is seasonal in 20% of cases, 40% permanent, and 40% combined (12). Atopic dermatitis is one of the atopic skin diseases that mostly occurs in childhood, and about 15% of the world's children suffer from this disease (13). The onset of symptoms of the disease in 50% of the cases occurs during the first year of life and 30% during 1 to 5 years (14).

Chronic urticaria is a vascular reaction that appears with symptoms such as erythematous inflation with white color and transient itching (15). In 10% to 40% of cases, chronic urticaria is caused due to an autoimmune response. In about 50%, the cause of acute urticaria is unclear. About 20% to 40% of acute urticaria progresses to chronic or recurrent urticaria (16). Angioedema is the swelling of the skin, subcutaneous tissue, mucosa, and submucosa. It is very similar to urticaria; however, it affects deeper tissues. Usually, in angioedema, the face, lips, mouth, and tongue swell within a few minutes to a few hours; sometimes hands, throat, and digestive tract are also affected. Such symptom can also be observed in the case of itching edema but are less than in those with urticaria (17). In general, food allergens may play a role in earlier start and increase of allergic diseases in some patients (18), and they may impact the quality of life of people, especially patients with allergies (19). So now, because of changes in the pattern of these allergens in different communities and regions, identifying food allergens in allergic diseases is of great importance (20). There are also various reports of the prevalence of food allergens in allergic diseases in different geographical regions and ages in Iran (21, 22). One of the standard methods to identify the allergens is the skin prick test that is a reliable method for the diagnosis of allergic diseases related to IgE. This method is less invasive, inexpensive, and reproducible, and the results are quickly available (23).

Considering the different food allergens in different geographical conditions and ages, as well as their importance in prevention of allergic diseases, this study was designed to investigate the prevalence of food allergens using the skin prick test in patients with allergies admitted to the super specialty clinic of asthma and allergy for children in Mofid Children's Hospital during 2010 to 2016.

MATERIALS AND METHODS

We conducted a descriptive-sectional study in the super special clinic of children in Mofid Hospital at Shahid Beheshti

University of Medical Sciences, Tehran. The studied population consisted of children with allergic diseases admitted to the super clinic of asthma and allergy during the years 2010 to 2016. A total of 466 children were selected as sample. In fact, statistical population was equal to all available forms of prick test results available in the clinic. The data were recorded in a made-up checklist based on the available documents in children's clinical files and the availability of the prick test results according to the determining initial factors such as age, gender, and type of allergic disease. A total of 44 different types of allergens qualified for the study. The skin prick test was performed on those patients. In this test, histamine was used as a positive control, and normal saline was used as a negative control. Common food allergens (Greer Co. America) were studied in 6 groups, including eggs (yolks and whites), dairy (cow's milk), meat (beef, lamb, chicken, and shrimp), nuts (walnuts, hazelnuts, peanuts, and almonds), fruits (bananas, grapes, strawberries, kiwi, watermelon, and honeydew melon), and cereals (wheat, soybeans, barley and rice). To run the test, extracts of allergens were placed in front of the wrist and at a distance of 2 cm from each other. Then skin scrape was done with a lancet (bloodless) at the place of allergen, and the test result was determined and compared with the control group after 20 minutes. The skin test was considered positive if the redness spread in more than 15 mm region of the wrist, and if there was a swelling of more than 3 mm, the test was considered negative. After getting the results of the skin prick test in the form of children's information, data were analyzed using SPSS version 21. In analyzing the data, descriptive statistics factors were used to describe the current situation, and the chi-square test and Fisher exact test were used to compare food allergy by age groups, gender, and type of allergic disease.

RESULTS

The study included 466 children with allergic diseases admitted to the super special clinic of asthma and allergy for children in Mofid Hospital during 2010 to 2016. The aim of this study was to determine the prevalence of food allergens in these children.

Results indicated that the mean age of children with allergic diseases under study was 7.4 ± 4.09 years, ranging from 1 to 18 years. In terms of gender, 273 patients (58.6%) were male, and 193 patients (41.4%) were female.

Regarding the type of allergic disease, 206 patients (44.2%) had asthma, 101 patients (21.7%) had allergic rhinitis, 10 patients (2.1%) had allergic sinusitis, 8 patients (1.7%) had conjunctivitis, 5 patients (1/1%) had angioedema, 54 patients (11.6%) had urticaria, 92 patients (19.7%) had eczema, and 125 patients (26.8%) had digestive allergic symptoms.

Also, with respect to the number of allergic disease in patients under study, 359 patients (77%) had 1 disease, 88 patients (19%) had 2 diseases, 14 patients (3%) had 3 diseases, and 5 patients (1%) had more than 3 allergic diseases.

Table 1 shows the age distribution of patients with a variety of allergic diseases. The mean ages for patients with asthma, allergic rhinitis, allergic sinusitis, conjunctivitis,

angioedema, urticaria, eczema, and allergic gastrointestinal symptoms were 7.9 ± 3.4 years, 8.4 ± 3.6 years, 10.1 ± 2.1 years, 10.4 ± 4.1 years, 8.4 ± 5.3 years, 7.5 ± 4.0 years, 7.1 ± 4.8 years, and 6.1 ± 4.2 years, respectively.

The distribution of age groups in patients with a variety of allergic diseases is summarized in Table 2. In general, children aged 7 years and older, in terms of allergic diseases, had a higher prevalence than other age groups.

Results show that 114 patients (24.5%) had food allergies, of which 50 patients (43.9%) were female and 64 (56.1%) were male. In patients with the negative food allergen skin test, 143 patients (40.6%) were female and 209 patients (59.4%) were male. There was no significant difference between the positive skin prick test and the gender of patients ($P=0.585$).

The data in Table 3 show that in patients with food allergy, 15 (13.2%) were less than 3 years of age, 27 patients (23.7%)

were between 7 and 3 years of age, and 72 patients (55.6%) were 7 years of age and older. While in patients with the negative food allergen skin test, 46 (13.1%) were less than 3 years of age, 119 patients (33.8%) were between 7 and 3 years of age, and 187 patients (53.1%) were 7 years of age and older. There was no significant difference between the skin prick test in terms of the age groups of patients ($P=0.112$).

With respect to the prevalence of food allergy in patients under study, 47 patients (41.2%) with asthma, 24 patients (21.1%) with allergic rhinitis, 4 patients (3.5%) with conjunctivitis, 2 patients (1.8%) with angioedema, 13 patients (11.4%) with urticaria, 28 patients (24.6%) with eczema, and 34 patients (29.8%) with allergic gastrointestinal symptoms had food allergies based on the prick skin test.

The prevalence of a variety of food allergens in different allergic diseases is given in Table 4. Data show that peanuts (7.9%), milk (7.3%), almond (6.6%), freshwater fish (6.6%), and nuts (6.4%) were the most common food allergens in patients who were under investigation.

Separately, in patients with asthma, shrimp (12.1%); in patients with allergic rhinitis, freshwater fish (15.8%); in patients with allergic sinusitis, cod fish (2.6%); in patients with conjunctivitis, freshwater fish (50.0%); in patients with angioedema, almond (50.0%); in patients with urticaria, freshwater fish (20.0%); in patients with eczema, tuna (10.5%); and in patients with allergic gastrointestinal symptoms, peanuts (7.6%) were the most common food allergens, respectively (Table 4).

DISCUSSION

According to the findings, it was revealed that from the total of 114 patients, 28 (24.5%) had food allergies; 50 patients

Table 1. Comparison of the age distribution of patients by type of allergic diseases in children admitted to the clinic of asthma and allergy for children in mofid hospital during 2010 to 2016

Allergic diseases	Age (Years)	
	Mean (SD)	Range
Asthma	7.9 (3.4)	1-16
Allergic rhinitis	8.4 (3.6)	1-16
Allergic sinusitis	10.1 (0.5)	7-13
Conjunctivitis	10.4 (0.25)	6-16
Angioedema	8.4 (5.3)	2-16
Urticaria	7.5 (4.0)	1-15
Eczema	7.1 (4.8)	1-18
Allergic gastrointestinal symptoms	6.1 (4.2)	1-18

Table 2. Comparison of the distribution of age group percentage by the type of allergic disease in children admitted to the clinic of asthma and allergy for children in mofid hospital during 2010 to 2016

Allergic disease	Age group		
	Less than 3 years	3-7 Years	7 Years and more
Asthma	10 (4.9%)	71 (34.5%)	125 (60.7%)
Allergic rhinitis	2 (2.0%)	33 (32.7%)	66 (65.3%)
Allergic sinusitis	0 (0%)	0 (0%)	0 (0%)
Conjunctivitis	0 (0%)	1 (12.5%)	7 (87.5%)
Angioedema	1 (20%)	1 (20%)	3 (60%)
Urticaria	9 (16.7%)	13 (24.1%)	32 (59.3%)
Eczema	22 (23.9%)	28 (30.4%)	42 (45.7%)
Allergic gastrointestinal symptoms	31 (24.8%)	43 (34.4%)	51 (40.8%)
Total	61 (13.1%)	146 (31.3%)	259 (55.6%)

Table 3. Comparison of the distribution of age group percentage based on the food allergen prick skin test results of children admitted to the clinic of asthma and allergy for children in mofid hospital during 2010 to 2016

Food Allergy	Age group			Level of meaningfulness
	Less than 3 years	3-7 Years	7 Years and more	
Positive	16 (13.2%)	27 (23.7%)	72 (63.2%)	0.112
Negative	46 (13.1%)	119 (33.8%)	187 (53.1%)	

Table 4. Comparison of the frequency percentage distribution of food allergens based on types of allergic diseases in children admitted to the clinic of asthma and allergy for children in mofid hospital during 2010 to 2016

Food allergens	Allergic diseases (%)								Total
	Asthma	Allergic rhinitis	Allergic sinusitis	Conjunctivitis	Angioedema	Urticaria	Eczema	Allergic gastrointestinal symptoms	
Milk	9.1	9.6	0.0	25.0	0.0	7.5	6.7	5.6	7.3
Yolk	4.5	8.2	0.0	12.5	0.0	7.4	8.0	4.1	5.7
White	8.0	4.3	0.0	25.0	0.0	5.6	2.3	2.4	5.1
Wheat	3.9	2.4	0.0	0.0	0.0	6.5	3.7	4.2	4.2
Wheat floor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barley	1.6	2.6	0.0	0.0	0.0	4.2	2.1	0.0	1.5
Soya	3.8	3.0	0.0	0.0	0.0	4.7	8.0	4.9	4.1
Rice	2.4	3.0	0.0	0.0	0.0	0.0	7.0	1.4	2.9
Chicken	2.3	3.4	0.0	0.0	0.0	4.3	2.3	3.5	2.6
Shrimp	12.1	7.1	0.0	0.0	0.0	6.3	4.8	4.8	6.1
Tuna fish	9.1	5.3	0.0	0.0	0.0	8.3	10.5	0.0	3.4
Freshwater fish	8.7	15.8	0.0	50.0	---	20.0	10.5	0.0	6.6
Cod fish	0.0	0.0	2.6	---	0.0	0.0	0.0	5.6	2.6
Beef	3.2	5.1	0.0	33.3	0.0	2.0	5.1	1.9	3.3
Peanut	9.0	10.8	0.0	0.0	25.0	10.0	8.6	4.3	7.9
Nut	9.4	5.6	0.0	16.7	0.0	8.7	8.6	3.6	6.4
Hazelnut	6.9	2.9	0.0	0.0	25.0	4.3	3.8	2.8	4.5
Tomato	3.6	0.0	0.0	0.0	0.0	4.2	0.0	2.6	1.8
Potato	0.0	0.0	0.0	0.0	0.0	11.8	5.3	2.7	2.8
Mango	0.0	0.0	0.0	0.0	---	16.7	0.0	0.0	2.4
Almond	5.8	5.6	0.0	0.0	50.0	3.3	11.9	7.6	6.6
Fresh mix	8.3	14.3	---	---	---	0.0	0.0	0.0	2.9
Peach	0.0	0.0	---	---	0.0	0.0	0.0	4.8	1.9
Mixed fish	1.0	4.1	0.0	0.0	0.0	2.6	1.7	1.2	1.9
Banana	4.3	4.9	0.0	0.0	0.0	0.0	5.0	1.1	2.9
Melon	3.1	0.0	0.0	0.0	0.0	0.0	3.7	1.3	1.4
Tangerine	1.8	3.1	0.0	0.0	0.0	5.9	0.0	0.0	1.9
Strawberry	7.1	0.0	0.0	---	0.0	10.0	0.0	2.9	3.9
Apple	5.3	0.0	---	---	0.0	20.0	5.9	0.0	4.4
Kiwi	6.3	5.6	0.0	0.0	0.0	0.0	0.0	0.0	2.4
Cocoa	0.0	0.0	0.0	0.0	0.0	5.9	0.0	1.8	1.5
Ginger	0.0	0.0	---	---	---	0.0	0.0	11.1	5.6
Celery	0.0	0.0	2.0	2.0	0.0	11.1	0.0	0.0	2.0
Onion	0.0	0.0	---	---	---	0.0	5.3	0.0	1.6
Vanilla	0.0	0.0	---	0.0	0.0	0.0	5.3	2.8	1.4
Mushroom	8.3	0.0	---	---	0.0	0.0	0.0	7.1	4.8
Sesame	4.5	0.0	0.0	0.0	0.0	13.8	3.7	4.7	4.6
Black pepper	0.0	0.0	0.0	---	---	0.0	0.0	0.0	0.0
Capsicum	0.0	0.0	0.0	---	0.0	0.0	0.0	4.0	1.7
Greener	0.0	0.0	---	---	---	0.0	0.0	0.0	0.0
Carrot	0.0	0.0	1.0	---	---	9.1	0.0	0.0	1.0
Olive	0.0	0.0	---	0.0	0.0	0.0	0.0	0.0	0.0
Mulberry	0.0	0.0	0.0	---	0.0	12.5	0.0	0.0	2.6
Red currant	0.0	0.0	0.0	---	---	0.0	0.0	0.0	0.0

(43.9%) were female and 64 (56.1%) were male. Statistically, there was no meaningful difference between the positive skin prick test with gender and age groups of patients ($P=0.112$). This finding is consistent with research findings of Onori and colleagues. The results of their study showed that among 282 patients with atopic dermatitis, 87 patients (31%; 52 females and 35 males) were sensitive to at least 1 food allergens (prick test, positive), and there was no meaningful difference between gender and food allergy in patients with atopic dermatitis. In people with atopic dermatitis with food allergies, asthma, allergic rhinitis, and urticaria were, respectively, 6.8, 11.4, and 4.5. The most common food allergens in patients were yolk (38.4%), egg white (36.5%), hazelnuts (33.3%), and peanuts (28.7%), and the least common were rice (4.6%), barley (5.7%), and sheep meat (6.9%). Eggs and nuts were the most common allergens, especially for children (24).

Other findings of the present study showed the prevalence of food allergy in patients under study. A total of 47 patients (41.2%) with asthma, 24 patients (21.1%) with allergic rhinitis, 4 patients (3.5%) with conjunctivitis, 2 patients (1.8%) with angioedema, 13 patients (11.4%) with urticaria, 28 patients (24.6%) with eczema, and 34 patients (29.8%) with allergic gastrointestinal symptoms had food allergies as confirmed by the skin prick test.

In addition, peanut (7.9%), milk (7.3%), almond (6.6%), freshwater fish (6.6%), and nuts (6.4%) were the most common food allergens in patients under study. Food allergens were more common at school ages. However, the findings of this study are consistent with the findings of other research, including the studies of Keshvari and colleagues (25), Ahangchian (26), Farajzadeh (27), Kim et al (28), and Burks (29).

CONCLUSION

Finally, according to the findings of the present study, the authors concluded that the prevalence of allergens in each area is under the influence of climatic conditions of each region, people's habits and food, racial differences, and different lifestyle. So the identification of allergens, avoiding them, selection of conscious food diet, along with drug therapy, play an important role in the treatment of children with allergic diseases.

ACKNOWLEDGMENTS

The authors sincerely thank the staff of the Mofid Children's hospital. This work was supported by Shahid Beheshti University of Medical Sciences.

AUTHOR CONTRIBUTIONS

FDB: Wrote the proposal, did the data collection and drafting of the manuscript

MM: Gave the concept of the study and supervised all the phases of the study

RSF: Did the statistical analysis and supervised all the phases of the study

All the authors read and approved the final draft of the manuscript.

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

ETHICAL STANDARDS

The protocol of this study was approved by the committee of ethics at Mofid Children's Hospital and the study conforms to the principles outlined in the Declaration of Helsinki.

REFERENCES

1. Kay AB, Bousquet J, Holt PG, Kaplan AP. Allergy and allergic diseases. 2nd ed. Hoboken: John Wiley & Sons; 2009.
2. Saadeh D, Salameh P, Baldi I, Raheison C. Diet and allergic diseases among population aged 0 to 18 years: myth or reality? *Nutrients* 2013; 5: 3399-423.
3. He S-h, Zhang H-y, Zeng X-n, Chen D, Yang P-c. Mast cells and basophils are essential for allergies: mechanisms of allergic inflammation and a proposed procedure for diagnosis. *Acta Pharmacol Sin* 2013; 34:1270-83.
4. Jahad Daneshgahi of Tehran University of Medical Sciences. Allergy subspecialty clinic 2018 [cited 2018 1/7/2018]. Available from: <http://allergyclinic.ir/fa/index.php/1389-08-24-11-03-02/1389-08-24-14-06-39.html>.
5. Hughes DA, Mills C. Food Allergy: a problem on increase. *Biologist (London)* 2001; 48: 201-204.
6. Kanny G, Moneret-Vautrin DA, Flabbee J, Beaudouin E, Morisset M. Population Study of food allergy in France. *J Allergy Clin Immunol* 2001; 108:133-140.
7. R.A. Wood. The natural history of food allergy. *Pediatrics* 2003; 111:1631-1637.
8. Hosseini S, Shoormasti RS, Akramian R, Movahedi M, Gharagozlou M, Foroughi N, et al. Skin Prick Test Reactivity to Common Aero and Food Allergens among Children with Allergy. *Iranian Journal of Medical Sciences* 2014; 39(1): 29-35.
9. Morris MJ, Argyros Col GJ, Batuello SG, Bessman E, Blackburn P, Brenner BE, et al. Asthma. Available at: <http://emedicine.medscape.com/article/296301-overview> Accessed February 2, 2012.
10. International Rhinitis Management Working Group. International consensus report on the diagnosis and management of rhinitis. *Allergy* 1994; 49: 1-34.
11. Milgrom H, Leung DYM. Allergic rhinitis. In: Kliegman RM, Stanton BF, St. Geme J, Schor N, Behrman RE, eds. *Nelson Textbook of Pediatrics*. 19th ed. Philadelphia, Pa: Saunders Elsevier; 2011. pp 775-780.
12. Howarth PH, VonMutius E, Martinez FD. Allergic and non allergic rhinitis. Natural history, development and prevention of allergic disease in childhood. In: Middleton's Allergy: Principles and Practice E-Dition, Franklin Adkinson N Jr, Yunginger JW, Busse WW, Boch-

- ner BS, Estelle F, Simons R, et al. 5th ed. USA: Mosby; 2003. pp 131-1407.
13. Leung DY. Atopic dermatitis (Atopic eczema). In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson Textbook of Pediatrics. 4th ed. Philadelphia: Saunders Company 2007; 970-5.
 14. Leung DY, Eichenfield LF, Boguniewicz M. Atopic Dermatitis. In: Fitzpatrick TB, Wolff K, Goldsmith LA, Katz S, Gilchrist BA, Paller AS, et al. Fitzpatrick's dermatology in general medicine. 6th ed. Philadelphia: Mc Grow Hill 2008; 146-8.
 15. Soter NA, Kaplan AP. Urticaria and angioedema. In: Freedberg IM, Eisen AZ, Wolff K, Austen KF, Goldsmith LA, and Katz SI. Fitzpatrick's dermatology in general medicine. 6th ed. New York: McGraw-Hill. 2003; 1129-39.
 16. Confino-Cohen R, Chodick G, Shalev V, Leshno M, Kimhi O, Goldberg A. Chronic urticaria and autoimmunity: associations found in a large population study. *J Allergy Clin Immunol.* 2012; 129 (5): 1307-13.
 17. Zuberbier T, Asero R, Bindslev-Jensen C, Walter Canonica G, Church MK, Gimenez-Arnau A et al. EAA-CI/GA(2)LEN/EDF/WAO guideline: definition, classification and diagnosis of urticaria. *Allergy* 2009; 64: 1417-1426.
 18. Katta R, Schlichte M. Diet and dermatitis: food triggers. *J Clin Aesthet Dermatol* 2014; 7: 30-36.
 19. Moghtaderi M, Aleyasin S, Amin R, Kashef S. Skin test reactivity to fungal aeroallergens in asthmatic children in southern Iran. *Iran J Pediatr* 2010; 20(2): 242-245.
 20. Kim HO, Cho SI, Kim JH, Chung BY, Cho HJ, Park CW, et al. Food hypersensitivity in patients with childhood atopic dermatitis in Korea. *Ann Dermatol* 2013; 25: 196-202.
 21. Salehi T, Pourpak Z, Karkon S, Shoormasti RS, Sabzevari SK, Movahedi M, et al. The study of egg allergy in children with atopic dermatitis. *World Allergy Organ J* 2009; 2: 123-127.
 22. Farrokhi S, Gheybi M, Movahed A, Iranpour D, Ostovar A, Vahdat K, et al. Evaluation of the frequency of food and aeroallergens in patients with eczema and urticaria in province of Bushehr: based on skin prick test reactivity. *ISMJ* 2011;17: 629-637.
 23. Heinzerling L, Mari A, Bergmann K-C, Bresciani M, Burbach G, Darsow U, et al. The Skin Prick test-European standards. *Clin Transl Allergy* 2013; 3: 3.
 24. Onsouri F, Ahmadi A, Mansouri M, Mousavi Khourshidi SM, Pazouki N, Salimian J. The prevalence of food allergens in patients with atopic dermatitis referred to allergy and asthma clinic in Tehran in 1393. *Journal of Kurdistan University of Medical Sciences* April 2016; 21: 40-46.
 25. Keshvari S, Shirvani A, Tahmasebi R, Omrani AM, Farrokhi Sh. Association Between Allergic Diseases and Food Allergens Based on Skin Prick Test in Bushehr Province. *Iran South Med J* 2017; 20(1): 46-56.
 26. Ahanchian H, Jafari SA, Jabbari Azad F, Kianifar HR, Karimi N, Khakshour A, Kiani MA. Evaluation of common allergens in children with atopic dermatitis by skin prick test. *Journal of North Khorasan University of Medical Sciences* Autumn 2013; 5(3): 551-555.
 27. Farajzadeh S, Bazargan N, Shahesmaeili A, Gholami Shahrbabaki A, Fekri AR. Evaluation of the Frequency of Food Allergens by Skin Prick Test in Children with Atopic Dermatitis. *Iranian Journal of Dermatology* Summer 2010; 13 (2): 33-36.
 28. Kim HO, Cho SI, Kim JH, Chung BY, Cho HJ, Park ChW, and Lee ChH. Food Hypersensitivity in Patients with Childhood Atopic Dermatitis in Korea. *Ann Dermatol* 2013; 25(2): 196-202.
 29. Burks AW, Tang M, Sicherer S, Muraro A, Eigenmann PhA. ICON: Food allergy. *Journal of Allergy and Clinical Immunology* April 2012; 129 (4): 906-920