



DOI: 10.14744/SEMB.2018.23911

Med Bull Sisli Etfal Hosp 2019;53(3):296-299

Original Research

Clinical and Laboratory Characteristics of Patients with Food Allergy: Single-Center Experience

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Abstract

Objectives: This study aimed to examine the clinical and laboratory features of the patients diagnosed with food allergy who applied to the pediatric allergy outpatient clinic.

Methods: This study was performed between March 2016 and December 2017 as a cross-sectional observational study. The files of 90 patients with food allergy were evaluated retrospectively.

Results: Ninety patients were included in the study. Sixty three (70%) of the cases were male and 27 (30%) were female. The median age of the patients was 12 months (range 3-156), and the age at onset of symptoms was 4 months (1-156). At the time of the diagnosis, the total number of eosinophils was 410/mm³ (0-4600), and the total IgE value was 83.1 IU/ml (3.17-2500). When the cases were divided into two groups according to their gender, no significant difference was found between the groups regarding the median age, onset age of the symptoms, total IgE, eosinophil and specific IgE levels. Fifty (55.6%) cases had atopic dermatitis, 31 (34.4%) had urticaria, 6 (6.7%) had proctocolitis, 2 (2.2%) had angioedema and 1 (1.1%) had anaphylaxis. Thirty-four (37.8%) of the cases had IgE-mediated, six (6.7%) cases had non-IgE mediated, and 50 (55.5%) cases had mixed type food allergy. The most common food allergens were egg 29 (32.2%), cow's milk and egg 27 (30%) and cow's milk 22 (24.4%). In the skin prick test, sensitivity was found in 52 (57.7%) patients. The most common sensitization was against egg (22.2%). Specific IgE values were found as F1: 0.87 kU/L (0.10-100), F2: 0.30 kU/L (0.10-96.90) and F5: 0.48 kU/L (0.10-53).

Conclusion: Egg and cow's milk allergy were the most common food allergens in our study. However; more than half of the patients were diagnosed with atopic dermatitis. Evaluation of the patients with atopic dermatitis in terms of food allergy may be appropriate.

Keywords: Child; cow's milk allergy; egg allergy; food allergy.

Please cite this article as "Can C, Altinel N, Bülbül L, Ayyildiz Civan H, Hatipoğlu S. Clinical and Laboratory Characteristics of Patients with Food Allergy: Single-Center Experience. Med Bull Sisli Etfal Hosp 2019;53(3):296-299".

Any reaction that occurs after the intake of food is an adverse food reaction and an adverse food reaction mediated by the immune system is defined as food allergy.^[1,2] Food allergy is most commonly seen with intake of milk, egg, wheat, soy, peanuts, nuts, fish and shellfish.^[3] Food al-

lergies are classified as immunoglobulin E (IgE) mediated, non-IgE mediated (non-IgE) and mixed type. In IgE-mediated food allergy, symptoms are seen after a short time (within minutes-2 hours).^[4] Skin (urticaria, angioedema), gastrointestinal system (oral allergy syndrome, gastroin-

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Submitted Date: November 13, 2018 **Accepted Date:** December 20, 2018 **Available Online Date:** August 26, 2019

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testinal anaphylaxis), respiratory system (acute rhinoconjunctivitis, acute bronchospasm) are affected, and anaphylaxis can be seen.^[4, 5] In non-IgE-mediated food allergies, reaction time varies between one hour and seven days.^[4] Non-IgE-mediated food allergies include food protein-induced proctocolitis, enterocolitis, enteropathy, celiac disease, pulmonary hemosiderosis and dermatitis herpetiformis.^[5] IgE-mediated and non-IgE-mediated reactions are seen together in mixed-type food allergies.^[4] Atopic dermatitis, contact dermatitis, allergic eosinophilic esophagitis, gastroenteritis and asthma are examples of mixed-type food allergies.^[5]

Food challenge is the golden standard in the diagnosis of food allergy.^[6] Skin prick test and specific IgE measurements used in the diagnosis of food allergy indicate sensitization to food. In addition to sensitization, the onset of the symptoms with food consumption supports the diagnosis of IgE-mediated food allergy. Skin prick test and specific IgE results are negative in non-IgE-mediated food allergies. Avoidance of allergenic food is the key point of food allergy treatment. Patients should be periodically evaluated for the development of tolerance.^[7]

This study aimed to evaluate the clinical and laboratory characteristics of food allergy patients admitted to the outpatient clinic of pediatric allergy department.

Methods

This study was carried out as an observational and cross-sectional study, including 90 patients with the diagnosis of food allergy between March 2016 and December 2017 in the outpatient clinic of pediatric allergy department of a training and research hospital. The files of the patients were evaluated retrospectively. The diagnosis of food allergy was made by the presence of symptoms (IgE-mediated, non-IgE-mediated, mixed type) with food intake, improvement of symptoms by eliminating food from the diet, food-specific IgE measurement and skin prick test. Age, gender, diagnosis and symptoms of the patients, total eosinophil count, total IgE levels and food-specific IgE measurements were recorded. Atopic dermatitis was diagnosed according to validated criteria.^[8]

Laboratory Measurements

Food-specific IgE levels were determined by chemiluminescence immunoassay method with 'IMMULITE 2000 Xpi Immunoassay System' (Siemens, Germany). Specific IgE levels for cow's milk (F2), egg white (F1) and a panel of food allergens (milk, egg white, cod fish, wheat, peanuts, soybean) (F5) were measured. The cut-off value was above 0.35 kU/L. A skin prick test was carried out with cow's milk, egg white,

egg yolk, wheat, peanuts, cocoa, tuna, strawberry and tomato allergens (Allergopharma, Reinbeck, Germany) Antihistaminic medication was discontinued 10 days before the test, histamine (10 mg/ml) was used as positive control and saline as negative control. In the absence of induration and/or dermographism in the negative control, test results with an induration of 3 mm or more were considered positive. This study was carried out with the approval of the local Ethics Committee of the hospital (Approval number: 2018/289).

Statistical Analysis

Statistical analyses were performed using the Number Cruncher Statistical System (NCSS), 2007, statistical program (Utah, USA). An independent t-test was used for the comparison of normal distribution variables. The Mann-Whitney U test was used in the comparison of non-normal distribution variables, and the chi-squared test was used in the comparison of qualitative data. Statistical significance was defined as a $p < 0.05$.

Results

A total of 90 patients were enrolled in this study. 63 (70%) of the cases were male and 27 (30%) of the cases were female. The presenting symptoms of the cases were rash in 81 (90%), blood in stool in six (6.7%), angioedema in two (2.2%), rash, angioedema and wheezing in one (1.1%) patient. The median age of all cases was 12 months (range 3-156), and the age at onset of symptoms was four months (range 1-156). At the time of the diagnosis, the number of eosinophils was $410/\text{mm}^3$ (0-4600) and the total IgE was 83.1 IU/ml (3.17-2500). The mean age was 16.50 ± 17.20 months in the male and 20.85 ± 32.54 months in the female group ($p = 0.41$). Demographic and laboratory characteristics of the cases were presented in Table 1. There was no significant difference between the groups according to

Table 1. Demographic and laboratory characteristics of the cases

	Male (n=63) Mean±SD*	Female (n=27) Mean±SD*	p
Age (months)	16.50±17.20	20.85±32.54	0.41
Age at onset of symptoms (months)	7.17±14.61	10.48±29.38	0.47
IgE (IU/l)	245.12±527.73	133.33±144.98	0.28
Eosinophils (mm^3)	540.79±422.60	641.11±878.26	0.46
Specific IgE levels(kU/L)			
F1	9.59±24.44	5.22±10.84	0.37
F2	4.81±10.60	5.19±18.71	0.90
F5	7.57±30.77	1.59±2.75	0.31

*Mean±Standard Deviation.

gender regarding age, age at onset of symptoms, total IgE, eosinophil and specific IgE levels.

Fifty (55.6%) cases had atopic dermatitis, 31 (34.4%) cases had urticaria, 6 (6.7%) cases had proctocolitis, 2 (2.2%) cases had angioedema and 1 (1.1%) case had anaphylaxis. Food allergies were IgE-mediated in 34 (37.8%), non-IgE mediated in 6 (6.7%), and mixed-type in 50 (55.5%) patients.

The most common food allergens were egg in 29 (32.2%), milk and eggs in 27 (30%) and cow's milk in 22 (24.4%) patients (Table 2). In skin prick test, sensitivity was found in 52 (57.7%) patients. Sensitivity to egg (22.2%) was the highest (Table 3). Specific IgE values measured in the cases were F1: 0.87 kU/L (0.10-100), F2: 0.30 kU/L (0.10-96.90) and F5: 0.48 kU/L (0.10 -53).

Discussion

Food allergy is an important health problem affecting millions of people all over the world and disrupting life quality of the individuals and their families.^[9] An increase in the

frequency of food allergy has been observed in the last three decades.^[10] The increase in food allergies in developed countries is explained by the hygiene hypothesis and is attributed to the potential effects of changes in environmental microbial effects on the immune system.^[11] Food allergies are usually seen in the first two years of life. The prevalence of food allergy is reported to be 6-8% in the first year of life and 3-4% in late childhood.^[12] In studies conducted in our country, Turkey, the findings showed that the prevalence of food allergy is 0.8% in 6-9 years in the Black Sea region and 2.4% in the first year of life in Adana.^[13, 14] Although the number of cases was limited in our study, the median age of the patients was first year of life. This result supports the studies on this subject.

While cow's milk and egg are the most common allergens in young children, with increasing age, the frequency of peanuts, nuts, fish and shellfish allergy increases.^[4] Cow's milk allergy is the most common food allergy in children when IgE and non-IgE-mediated food allergies are evaluated together.^[7] Egg allergy is the second most common food allergy in children after cow's milk allergy.^[15] Egg (57.8%) and cow's milk (55.9%) were the most common allergens in children diagnosed with food allergy between 2002 and 2009 at Hacettepe University Faculty of Medicine Department of Pediatric Allergy, followed by hazelnut (21.9%), peanuts (11.7%), walnuts (7.6%), lentils (7%), wheat (5.7%) and red meat (5.7%).^[16] In a study conducted by Şenol et al.^[17] with 79 children in Van, cow's milk (46.8%) and egg (27.8%) were identified as the most common food allergens. In our study, egg, cow's milk, peanuts, fish and wheat were the common food allergens. Similar to previous studies that were conducted in our country, cow's milk and egg were evaluated as the most common food allergens.

Children with food allergy have an increased risk of allergy with more than one food allergen.^[10] In our study, 34 (37.7%) of the cases had an allergy with more than one food allergen. The most common combination of food allergens was between cow's milk and egg.

Atopic dermatitis is a chronic inflammatory skin disease characterized by itchy and inflamed skin, commonly seen in infancy and early childhood.^[18] One-third of children with moderate-severe atopic dermatitis have food sensitivity. Significant improvement in lesions of atopic dermatitis is observed by removing the responsible food from the diet. Egg is the most common food allergen in children with atopic dermatitis.^[7] Şenol et al.^[17] reported atopic dermatitis in 48.1% of the patients with food allergy. Skin prick tests have high sensitivity and specificity for food allergens such as milk, egg, peanuts and wheat.^[19] Şenol et al.^[17] re-

Table 2. Distribution of the cases according to food allergens

Food allergens	n=90	%
Egg	29	32.2
Milk + egg	27	30.0
Milk	22	24.4
Milk + egg + peanut	3	3.3
Peanut	3	3.3
Fish	2	2.2
Milk + egg + fish + peanut	1	1.1
Milk+ peanut	1	1.1
Milk + egg + wheat + peanut	1	1.1
Egg+ fish	1	1.1

Table 3. Distribution of the cases according to skin prick test results

Food allergens	n=90	%
Negative	38	42.2
Egg	20	22.2
Milk + egg	13	14.4
Milk	7	7.8
Peanut	3	3.3
Milk +peanut	2	2.2
Egg + fish + peanut	1	1.1
Fish + wheat + tomato	1	1.1
Egg + wheat	1	1.1
Milk + egg +peanut+ wheat	1	1.1
Egg + peanut	1	1.1
Egg +fish	1	1.1
Fish	1	1.1

ported that skin prick test sensitivity was most frequently detected with egg. In our study, sensitivity in skin prick test was found in 52 (57.7%) of the patients while the highest sensitivity was detected against egg (22.2%).

Conclusion

In conclusion, food allergy may start at different times in children; different food allergens can cause clinical findings with different types of allergic reactions. In our study, most of the patients had a mixed-type food allergy and egg and cow's milk were the most common food allergens. However, more than half of the patients were diagnosed with atopic dermatitis. Evaluation of the patients with atopic dermatitis in terms of food allergy may be appropriate.

Disclosures

Ethics Committee Approval: This study was carried out with the approval of the local Ethics Committee of the hospital (Approval number: 2018/289).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – C.C.; Design – C.C.; Supervision – C.C., L.B., S.H.; Materials – C.C., N.A., H.A.C.; Data collection &/or processing – C.C., N.A., H.A.C.; Analysis and/or interpretation – C.C., L.B.; Literature search – C.C., N.A.; Writing – C.C., N.A., L.B., H.A., C.S.H.; Critical review – C.C., S.H.

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