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ORIGINAL ARTICLE

Evaluation of the frequency of food allergens based on skin prick test in children in Kurdistan Province – Iran

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Abstract
Introduction: Food allergy refers to abnormal reactions of the body caused by an immune system response to food. This study was conducted aiming to investigate allergy to food allergens in children with food allergies.
Materials and methods: This study was conducted as a cross-sectional one on 304 children aged six months to seven years with food allergies admitted to the tertiary referral hospital in Kurdistan Province – Iran, during 2014–2015. All the patients were examined for skin prick test using 49 allergens. Finally, the obtained data were analysed using SPSS15 and chi-square and *t* tests.
Results: The highest percentage of occurrence of bump reaction (wheal) and redness (flare) was due to the consumption of fish, eggs, tomatoes, and cocoa. Moreover, the lowest rate of wheal and flare was caused by exposure to allergens like latex, tea, malt, and wheat flour. The reaction most created due to the consumption of foods was flare which was higher among under three-year-olds group ($p < 0.05$), and between the sexes, girls showed the most common allergic reactions ($p < 0.05$).
Conclusion: Since food allergy has a high prevalence in children, it should be considered with great interest. Considering that avoiding food allergens is the first step in the treatment of food allergies, the present study may be a useful guide in this regard.

Introduction

Food allergy refers to abnormal reactions of the body caused by an immune system response to food.[1] The symptoms of this type of allergy are caused after consumption of certain

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foods and cause a change in the function of various organs of the body.[2] These symptoms occur within a few minutes, sometimes several hours, and sometimes within 24 h or more after eating food.[2] Clinical manifestations of this disease are observed in parts such as skin (60%), gastrointestinal system (20%), respiratory tract (20%), and cardiovascular system (15–20%).[3] Allergic diseases may occur at any age but the highest incidence is observed in neonates and children of 1–3 years of age, and its prevalence significantly reduces with age.[2] Identifying allergy symptoms in children is of special importance because it greatly helps early diagnosis and more effective treatment of this disease.[4] Food allergies are most common in childhood, so that the prevalence of food allergy in children is estimated to be up to 10% and in atopic children up to 30%, whereas this amount is less than 2% in adults.[1] In children, more than 85% of food allergens are reported to be related to cow's milk, egg, peanut, soy, fish, and wheat.[5] Gastrointestinal mucosal surfaces are the principal place of formation of allergic reactions that have the ability to distinguish between safe food, normal flora bacteria, and dangerous pathogens.[6,7] Among the risk factors of creating food allergies is the activation of Th2 cells, which secrete interleukins 4 and 13.[8] These cytokines stimulate B cells to secrete E immunoglobulins and bind these antibody mast cells in the tissue.[9] This leads to the release of substances such as histamine to the blood, and increases fatty acids metabolism such as arachidonic acid to produce leukotrienes and prostaglandins. With repeated reception of antigen, mononuclear cells are stimulated to release histamine releasing factor (HRF) that increases the release of histamine. Histamine and other chemical mediators are in fact responsible for the symptoms observed in allergy.[10,11] It seems that in children with incomplete development, different components of the immune system reduce the efficiency of this system against foreign antigens. This could have an important role in more prevalence of food allergies and gastrointestinal infections early in life.[12] The outbreak of this disease is varied in different countries and is largely influenced by the food culture of the people.[1]

Due to the growing prevalence of food allergies and various manifestations of this disease, such as restlessness, lack of proper weight gain, digestive, respiratory, and skin symptoms that can cause many problems for the patients, we intended to evaluate patients with symptoms suspected of food allergies to identify the type of common food allergens in the Kurdistan region in children of six months to seven years.

Materials and methods

Sample size and sampling method

This study was conducted as a cross-sectional one on children aged six months to seven years with food allergies admitted to the tertiary referral hospital in Kurdistan Province, Iran, during 2014–2015. To detect allergy in the patients studied, skin prick test was used. Using the results of previous studies that have determined the most common allergens as peanut with the prevalence of 53%, type I error of 5%, and the power of the study of 95% sample size was calculated as 304 people. They were selected using a convenience sampling method.

Practical tests

All patients of six months to seven years of age, who referred to the paediatric gastroenterology clinic with symptoms of food allergy, such as restlessness, lack of proper weight gain, digestive, respiratory, and skin protests were sent to conduct prick test in the immunology clinic, where the tests were conducted using a standard food kit. According to the global standard protocol, a drop of extract allergens under study was placed on the anterior surface of the forearm, a small skin scratch balance was created, and redness and swelling of skin reactions were recorded after 15 min. Three millimetres or more swelling was considered as negative on positive skin reaction. Forty-nine allergens were identified, based on common Iranian diet that included pepper, lemon, orange, kiwi, watermelon, peach, cocoa, garlic, wheat flour, wheat, rice, soy, egg, yolk and egg white, cow's milk, fish, shrimp, barley, maize, sesame, malt, mustard, curry, olives, carrots, cucumbers, spinach, celery, tomatoes, apples potatoes, bananas, apples, strawberries, plums, grapes, beans, pistachios, walnuts, hazelnuts, peanuts, almonds, tea, coffee, onions, latex, cherries and pears.

Statistical analysis

After entering data into SPSS 15, frequency, percentage, mean and standard deviation were calculated, and the tables were drawn. To compare qualitative variables in different groups, chi-square or Fisher exact test, and to compare quantitative variables, *t*-tests were used in two groups.

Table 1 Characteristics of the studied population.

	Gender		Age		Diagnose			
	Boy	Girl	Less than 3 years	More than 3 years	Food allergy	Asthma and food allergy	Rhinitis and food allergy	Atopic dermatitis and food allergy
Frequency	146	158	262	42	300	1	2	**1**
Percent	48	52	86.2	13.8	98.7	0.3	0.7	**0.3**

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