

# Food Allergy: Always a Threat, How do We Treat it?

Sur Genel<sup>1,2</sup>, Emanuela Floca<sup>1\*</sup> and Lucia Sur<sup>1</sup>

<sup>1</sup>University of Medicine and Pharmacy, Iuliu Hatieganu, Cluj-Napoca, Romania

<sup>2</sup>Emergencies Clinical Hospital for Children, Cluj-Napoca, Romania

## Abstract

Food allergy is a disorder with high frequency in children. The similarities of gastrointestinal food allergy symptoms with those of other diseases make it difficult to diagnose the disease. Digestive symptoms of food allergy can range from mild to severe, including anaphylaxis. Treatment consists of food allergen avoidance and medications to relieve symptoms and their remission. Thus, the most important aspect is highlighting suspected allergen and subsequent food allergen avoidance.

**Keywords:** Food allergy; Anaphylaxis; Child; Treatment

## Introduction

Food allergies are a public health concern with a significant impact on quality of life, their prevalence is increasing [1]. Food allergy is defined as the totality of immunologic mediated symptoms caused by the consumption of food. Immune responses are IgE-mediated, non-IgE mediated, or combination of both. Food allergy should be distinguished from food intolerance, which is not an immunologically mediated reaction [2-4].

Classification of gastrointestinal reactions caused by food consumption is based on symptoms and affected segment of digestive tract. Symptoms vary from mild to severe, including anaphylaxis. Food-induced anaphylaxis is increasing. Digestive symptoms may be accompanied by respiratory and cutaneous manifestations. Anamnestic and clinical data are essential for diagnosis. Skin tests and food-specific IgE are useful for identifying food allergy. In some cases, oral challenges may be indicated [3,4].

Milk, eggs, peanuts and soy are the most common food allergy in children, while peanuts, fish, shellfish are common in adult. Avoiding food allergens, therapy of symptoms and administration of epinephrine in anaphylaxis are included in the management of food allergies [3-5].

## Epidemiology

The prevalence of food allergy is difficult to assess. Prevalence based on patients self-report is higher than that based on anamnesis and clinical medical data. Although 25% of adults perceive that they have food allergies, according to medical data prevalence is estimated at 2-4%. The prevalence of food allergies in children is higher than in adults ranging between 6% and 8%. Higher frequency is common in children aged between 3 months and 2 years [1,2,4].

The proportion of cases of anaphylaxis due to food consumption varies between 13% and 65%. In the U.S., 30% of fatal anaphylaxis is caused by food allergens. Approximately, 90% of these cases are associated with the consumption of peanuts or tree nuts [6].

Food allergy is more common in atopic people. According to recent studies, children with food allergy are prone to 2 to 4 times more to have other allergic diseases. Thus, 35% to 71% have atopic dermatitis, 33% to 40% have allergic rhinitis and 34% to 49% have asthma [1].

The II Pediatric Clinic's cases, from January 2011 until July 2012, have noted 149 children that had positive specific IgE to one or more foods and presented bloating, abdominal cramps, nausea,

vomiting, diarrhea. Infectious causes that could cause gastrointestinal manifestations were excluded.

In our study, prevalence of gastrointestinal food allergy is about 2%. Depending on the path, physiological mechanism children presented: oral allergy syndrome (7.4%), allergic eosinophilic esophagitis (39.6%), allergic eosinophilic gastritis (22.8%), and allergic eosinophilic gastroenteritis (30.2%). Association with other manifestations than gastrointestinal showed the following: atopic dermatitis (12%), urticaria (47%), allergic rhinitis (18%), acute bronchiolitis (20%) and anaphylactic shock (2%).

## Pathophysiology

The mechanism of food allergy is not known exactly. There are several ways of producing food allergy: IgE-mediated mechanism, non IgE-mediated mechanism and mixed (IgE and non-IgE mediated) [1,7] (Table 1).

In IgE-mediated reactions, mast cells play an important role by releasing histamine and other inflammatory mediators [8,9]. These inflammatory mediators cause various systemic effects, such as increased vascular permeability and smooth muscle contraction, that have as clinical equivalent food allergy symptoms. In non-IgE-mediated reactions, lymphocytes have the primary role. IgE-mediated allergic reactions have an acute onset compared with non IgE-mediated with a delayed onset [7,10].

There are food allergens that have similar structure to other allergens or aeroallergens. Cross-reactivity is a phenomenon that occurs when antibodies react with both the original allergen and with similar one. This phenomenon produces similar allergic reactions. Cross reactivity is detected in various foods, and is influenced by the level of IgE [1,2].

## Etiology

Food allergens are proteins or glycoproteins that produce an

\*Corresponding author: Emanuela Floca, University of Medicine and Pharmacy, Iuliu Hatieganu, Cluj-Napoca, Romania, E-mail: [emma\\_floca@yahoo.com](mailto:emma_floca@yahoo.com)

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IgE-mediated Mechanism	Mixed mechanism: IgE-mediated and non-IgE	Non-IgE-mediated mechanism
Immediate gastrointestinal hypersensitivity	Eosinophilic esophagitis	Food protein-induced allergic proctocolitis
Oral allergy syndrome	Eosinophilic gastroenteritis	Food protein-induced enterocolitis syndrome

**Table 1:** Classification of gastrointestinal food allergy.

No.	Disease	Characteristics
1	Immediate gastrointestinal hypersensitivity	- nausea, emesis and abdominal pain within 1 to 2 hours of exposure to the allergen - diarrhea within 2 to 6 hours of exposure to the allergen
2		- those with a history of sensitivity to pollen are usually affected - occurs from eating fresh fruits and vegetables - symptoms are localized to the oropharynx (lips, tongue, roof of the mouth, throat) - symptoms include itching, swelling, and tingling
3	Eosinophilic esophagitis	- eosinophilic inflammation of the esophagus - children: gastro-esophageal reflux, vomiting, abdominal pain, feeding disorders - Adolescents and adults: dysphagia and esophageal food impactions
4	Eosinophilic gastroenteritis	- symptoms depend on the affected portion of the gastrointestinal tract - symptoms include abdominal pain, vomiting, early satiety, anorexia, and sometimes hematemesis - if eosinophilic infiltration is located in the antrum patient may present symptoms of pyloric stenosis
5	Food protein-induced allergic proctocolitis	- usually presents in infants - stool with streaks or specks of blood mixed with mucus - symptoms include vomiting, diarrhea, and growth failure - allergenic foods are milk and soy
6	Food protein-induced enterocolitis syndrome	- usually presents in young infants - symptoms include chronic emesis, diarrhea, and failure to thrive - milk and soy are foods involved - reintroduction of food after a washout period occurs with repeated vomiting and dehydration syndrome

**Table 2:** Clinical presentation [1,14,15].

immune response. Although, theoretically any food can induce an immune response the majority of allergic reactions are caused by the “big eight food”: peanut, tree nuts, egg, milk, fish, crustacean shellfish, wheat, and soy [11].

Cow’s milk allergy is common in children. It is produced both by IgE-mediated mechanism and non IgE-mediated. Half of children with cow’s milk allergy develop allergic reactions to other foods and 80% to aeroallergens. Cross-reactivity between cow’s milk and the goat or sheep may occur in 90% of cases, while the cross-reactivity between cow’s milk and the mare is only 4%. About 85% of children lose their sensitivity to cow’s milk proteins to 3 or 5 years [1,12].

Egg allergy is common in children, with a prevalence of 2.5%. The mechanism is most often IgE-mediated. Children lose their sensitivity to egg around the age of 5 years. Patients with egg allergy during childhood are more likely to develop sensitivity to aeroallergens later [3].

Peanut allergy is often associated with anaphylaxis, and can sometimes be fatal. Peanut allergy manifestations include both gastrointestinal and skin reactions, such as urticaria and atopic dermatitis. Increasing prevalence of peanut allergy is directly related to increasing their consumption. There are studies that support the degree of allergenicity of peanuts, depend on the method of processing. Such allergy is more common when dry roasted peanuts, unless they are boiled or fried. More allergens were found involved in peanut allergy, but the major allergens are Ara h 1, 2 and 3. A rate of 25-30% of patients with peanut allergy shows co-reactivity to tree nuts. Peanut allergy lasts a long time, sometimes entire life [12].

Tree nut allergy is a lifelong one. There is cross-reactivity between different types of tree nuts. So experts recommend that patients who are allergic to a variety of tree nuts to avoid the consumption of all types of nuts [12]. Soy allergy is usually transient [1].

Seafood allergy is widespread and the frequency depends on the eating habits. It is more common in adults than children. It has been

shown that there is cross-reactivity between different species of fish. Itching of the mouth and emesis are common symptoms in allergy to fish. Fish allergy is usually persistent for life [3].

## Clinical Presentation

Gastrointestinal food allergy symptoms vary depending on the affected portion of the digestive tract. The patient may experience bloating, abdominal pain, nausea, vomiting and diarrhea. Symptoms can occur within minutes of ingesting food allergens until hours or even days.

Children with gastrointestinal food allergy can experience a variety of respiratory and skin conditions [13]. Food allergens can cause atopic dermatitis, contact dermatitis and urticaria, with or without angioedema [14-16]. Respiratory diseases include rhinitis, wheezing and asthma. Such children may experience sneezing, runny nose, wheezing and asthma attack (Table 2).

Anaphylaxis is the most important manifestation of food allergy. In the United States, food allergy is the leading cause of anaphylaxis, and allergy to peanuts is the most common. Anaphylaxis usually occurs by IgE-dependent immunologic mechanism. Manifestations of anaphylaxis include difficulty breathing, low blood pressure, tachycardia, dizziness, loss of consciousness. Cutaneous manifestations, such as urticaria, pruritus and rash are commonly found in anaphylaxis [2,6,16].

## Diagnostic Approach

The first step for diagnosis is a detailed medical history to correlate symptoms with food intake. Physical examination of the patient can identify signs of an allergic reaction, but also can detect signs of a non-allergic disorder that would require investigation. Usual laboratory tests can detect eosinophilia [17].

Diagnostic methods for IgE-mediated food allergies include skin prick test, intradermal tests, allergen-specific serum IgE and atopy patch test. These tests can identify food allergens, but they are not

specific and neither sensitive. Of skin tests, most commonly used is the prick-test. Intradermal tests are not indicated to be used because of possible systemic side effects [1,18].

Specific IgE are elevated in patients sensitized to those food. Patients sensitized to different foods may not show clinical symptoms. Measurement of specific IgE has a higher specificity than skin prick testing. Measurement of specific IgE can be done in patients with skin disorders that prick skin testing is contraindicated [1].

Food elimination diets may be useful both in IgE-mediated allergic reactions, and in the non IgE-mediated or mixed ones. A detailed history, followed by elimination of the offending food, can lead to remission of symptoms [1,19].

Double-blinded placebo-control food challenge is the gold standard for diagnosing food allergy. Food challenge test is done after a two week washout period of diet foods that will be tested. Patients with a history of asthma or anaphylaxis, with increased specific IgE levels, have an increased risk of developing life-threatening systemic reactions. In these patients, do not practice food challenge tests [2].

Because there are no specific tests for non-IgE-mediated food allergies, food elimination diet and oral challenge are used for diagnosis.

For the diagnosis of eosinophilic esophagitis and eosinophilic gastroenteritis will practice endoscopy and mucosal biopsy.

## Differential Diagnostic

1. Food intolerance has clinical manifestations similar to food allergy. In the production of food intolerance, immune system is not involved. It is found the deficit of one or more enzymes. The onset can be at any age and is not accompanied by adverse life threatening compared with food allergy [2].

2. Allergic reactions caused by other allergens, such as medication or insect sting.

3. Parasite infections, gastroesophageal reflux disease, systemic eosinophilic disorders, vasculitis and anatomical disorders should be considered.

4. Behavioral and mental disorders, such as anorexia nervosa and bulimia.

5. Chemicals and additives that may occur in foods can cause symptoms similar to allergic reactions [1].

## Management of Food Allergies

Dietary elimination is the only way to prevent food allergy. After a period of 2-4 years to eliminate food allergens from the diet, the patient may gain tolerance to food. The diet should be supervised to not lead to nutritional deficiencies [1]. There are foods that can give up more easily, without a major nutritional importance, such as exotic fruits. There are some foods, such as cow's milk for children that are necessary daily nutrition. In this situation, there is hypoallergenic formula containing cow's milk with hydrolyzed proteins. It is possible administration of soy protein milk, but children may develop sensitivity to it. For very sensitive children, hydrolyzed protein formula is recommended. The existence of hidden ingredients from common preparations leads to accidental ingestion of sensitizing substance [4].

Administration of epinephrine in anaphylaxis is the first therapeutic step. Patients at risk for anaphylaxis should be educated to know the

risks they are exposed. If necessary, they should also be instructed to administer epinephrine [20,21].

Antihistamines are recommended for relief of symptoms and their remittance. H1-antihistamines are first choice drugs in allergic diseases. Second generation H1-antihistamines are preferred for their non-sedating effect [12].

Effect of improvement in symptoms secondary the administration of cromolyn has not yet been proven [1].

Allergen-specific immunotherapy is a method under study. Administration of increasing doses of allergen or cross-reactive allergen can result in desensitization of patient. Thus, immunotherapy is a method that could lead to desensitization and even getting the long-term tolerance [1]. There are studies that show good performance of the practiced oral immunotherapy in patients with peanut allergy [21]. Immunotherapy is not currently recommended for the prevention of food allergy [22].

Primary prevention of food allergy include diet of pregnant women, with the exclusion of the "big eight foods" during pregnancy and breastfeeding. It is recommended, exclusive breast feeding about 6 months and the introduction of allergenic foods in the diet as late as possible. Secondary prevention consists in identifying the allergen and its subsequent exclusion from the diet. The focus is on the need of safe food for sensitized patients. The labeling of foodstuffs specifying all substances would reduce allergic reactions caused by so-called hidden food [1].

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