

## Food Allergy

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### Food Allergy

A food allergy usually occurs when the body reacts abnormally to a food. The symptoms of food allergy may range from mild to severe. The onset of food allergy usually begins in the childhood, but it can occur at any age. The onset of allergy may vary from minutes to several hours. Reactions to foods are not limited to ingestion reactions only, but even a tiny amount of the allergy-causing food can trigger signs and symptoms such as digestive problems, hives or asthma.

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### What is a food allergy?

A food allergy usually occurs when the body reacts abnormally to a food. A person has a food allergy when they cannot tolerate one or more foods and their immune system is involved in creating the symptoms. The immune system functions to clear the body of foreign substances or antigens such as viruses, bacteria, blood cells or tissue cells. Normally when antigens interact with cells of the immune system, they are cleared from the body without an adverse reaction. Allergy is different as in that sensitization occurs and this happens on the first exposure of the immune cells to the allergen.

Food intolerance and food sensitivity are terms for all reproducible adverse reactions to specific foods or ingredients which are not psychologically based [1].

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Infants have an immature immune response system, so at 4-6 months of age, new foods should be introduced individually so that their gut gets used to it. Among children, most allergic reactions to food are caused by peanuts, milk, soybean, tree nuts, eggs, and wheat. Majority of the children stop being allergic to foods when they reach the age of four. Allergic adults typically react to citrus fruit, nuts, fish, peanuts, shellfish, and wheat.

### Immune System Response to Food Allergy

The immune system consists of three barriers that are based on each other, and protect from disease. Three types of cells respond to antigens present: B lymphocytes, T lymphocytes and macrophages [2].

In classic food allergies, the specific immune system response plays the lead role. After antigen contact, the body responds with an excessive reaction by releasing IgE antibodies. The symptoms are acute as of sneezing, coughing, watery eyes, skin rash or nausea.

In food intolerance, the innate immune system sends out other messengers to fetch other immune cells to help.

The consequences of food induced activation of the immune system may be subtle at the initial stage but may become serious overtime. The symptoms might be serious too including gastritis, reflux, eczema, psoriasis, reduced immune status against viral infections or allergies etc.

### Difference between Food Allergy, Food Intolerance and Food Poisoning

Food allergy and food intolerance are very difficult to distinguish from one another. Whether objective changes are present or not, the diagnosis of food intolerance can only be established if the symptoms disappear with an elimination diet and if a controlled challenge then leads either to the recurrence of symptoms or to some clearly identified change [1].

While food allergy is an abnormal reaction of body's immune system to food which involves numerous organs of body and can be life-threatening, food intolerance or food hyper-sensitivity is an adverse food reaction when a person feels difficulty in ingesting a particular food which can cause an unpleasant physical reaction to them. It can be caused by toxic, pharmacological or metabolic reactions [2]. The symptoms are generally less severe and limited to digestive system often.

On the other hand, food poisoning also known as food-borne illness, results when a person consumes contaminated, spoiled or toxic food resulting in nausea, vomiting or diarrhea. Food poisoning can be life threatening if the symptoms include fever > 3 days, severe dehydration or bloody urine etc.

## At-Risk Population

Any person, especially a child, who has a genetic predisposition to atopic disease or atopy, has an increased probability of developing food allergies. The incidence of food allergy appears to decrease with age. Infants younger than two years are more likely to develop food allergies than are older children or adults. Older children and adults are more likely to develop inhalant allergies than food allergies [2].

## Food Allergens

Common food allergens include milk, peanuts, eggs, wheat, rice, soy, fish, walnuts, mustard and lupin.

### Milk Allergy

Milk allergy, sometimes synonymously used with lactose intolerance, is one of the most common allergies in children and adults. It is a true food allergy caused by an allergic reaction to the protein in milk. The reaction usually occurs minute to hours after consuming milk. Mild symptoms may include wheezing, vomiting, hives, digestive problems etc. Avoidance of milk products and adopting a lactose free diet is the primary treatment for those people who don't outgrow it and the response is excellent.

Whereas lactose intolerance is caused by not having enough of the enzyme lactase, which is needed to break down lactose, the sugar found in milk and other dairy products. Lactose is one of the disaccharides contained within the brush border of small intestine epithelial cells. In the human, lactase activity is detectable in the fetal gut as early as 8 weeks' gestation [1]. Persons who have a deficiency of the intestinal enzyme lactase have a decreased ability to digest lactose and experience symptoms of abdominal cramping and etc. Others may not lack intestinal lactase activity, lactose is absorbed and marked lactosuria together with aminoaciduria, proteinuria and renal tubular acidosis is found.

Infants may develop severe diarrhea, vomiting and acidosis within the first few days of life and is a life threatening situation. It should be noted that even a small amount of lactose can precipitate the symptoms, but it is a transient disorder from which the child recovers between 12 and 18 months of age.

### Wheat Allergy

Wheat allergy, also known as celiac disease, is characterized by an abnormal jejuna mucosa which recovers on withdrawal of gluten from the diet of susceptible individuals and relapses on its introduction.

The main genetic marker is HLA DQW2 on chromosome 6. Gluten is a protein and consists of an insoluble fraction, glutenin and a soluble fraction containing a series of gliadin. It is the gliadins that are toxic [1].

Wheat allergy is perhaps the one disease among all gut disorders where diet is the key to management. Gluten is present in wheat, rye, barley, oats so these must be excluded from the diet for life, whereas rice, corn and maize products are safe. Symptoms may include skin rash, stomach cramps, vomiting diarrhea etc.

Avoiding gluten is easier said than done. Although obvious foods such as breakfast cereals, bread, cakes, pastry, biscuits and pies can be omitted; hidden sources of gluten may include vermicelli (Siwayyan), Nihari, drumsticks. Sometimes, ketchup, mayonnaise, salad dressings, white pepper and even toothpaste can contain hidden gluten. Gluten may also be present in gravies thickened with flour or in those flavored with soy sauce or malt vinegar. Soy sauce is a common ingredient in many marinades and sauces served in restaurants and sold in grocery stores. Sausages, meatloaf, meatballs, and other ground meats often contain wheat-based fillers. Breadcrumbs may be added to hamburger patties to bind the meat and improve texture. Many vegetarian meat alternatives, such as veggie burgers and vegetarian sausages, are made with seitan, also known as wheat gluten. Others are made with gluten-containing flours or breadcrumbs that act as binders. And while tofu in its unadulterated form is gluten free, the fried tofu served in restaurants may be fried in a gluten-containing batter or marinated in a soy sauce that contains wheat. Whole potatoes found in the produce department in supermarkets are gluten free, but potato chips and fries can be hidden sources of gluten. Potato chips may be seasoned with malt vinegar or contain wheat starch. Even if patient chooses any item which is apparently gluten free, however there is high chance of cross contamination [3].

### Egg Allergy

Egg allergy can develop when people become sensitized with proteins present in egg whites or yolks. When eggs are eaten, the body considers protein as foreign invader and release out chemicals to defend against it, as a result of which allergy occurs.

Symptoms of an egg allergy reaction can range from mild, such as hives, to severe, such as anaphylaxis. Some other Symptoms are skin rash, hives, nasal congestion, vomiting or other digestive problems. Allergic reactions can be unpredictable, and even very small amounts of egg can cause one.

To prevent a reaction, it is important that you avoid eggs and their products. Usually the protein in egg whites is the cause and as it is difficult to separate egg whites from egg yolks completely, complete eggs should be avoided. Cross contact will always be a concern. Apart from avoiding major egg products, like egg (dried, powdered, solids, whites, yolk) and mayonnaise, they are also found in baked goods (although some people can tolerate these), ice-cream, marshmallows, pasta, specialty coffee drinks (eggs used in the foam or toppings) should also be avoided.

### **Peanut Allergy**

Both peanuts and tree nuts (walnuts, hazelnuts, almonds, cashews, pecans and pistachios) can cause allergic reactions, which are sometimes severe. A severe reaction to nuts is called anaphylaxis and can be life-threatening. Incubation period for this type of allergy is very short even within an hour of coming into contact with a nut, and sometimes within minutes.

Symptoms to peanut allergy can cause itchiness, swelling, eczema, sneezing, asthma, and diarrhea and if the allergy persists, cardiac arrest can also result.

Peanuts are not nuts; they are legumes, in the same family as peas and beans. Peanuts grow underground but other nuts grow on trees. So if you are allergic to peanut, avoid eating peanut and its products.

### **Soya Allergy**

Soybean allergy is common food allergies, especially in babies and children. Soybeans is a member of the legume family. Beans, peas, lentils and peanuts are also legumes. Being allergic to soy does not mean you have a greater chance of being allergic to another legume.

Soy allergy, similar to other food allergies can cause mild symptoms and can be treated by eliminating soy and its products from the diet. Common reactions include diarrhea and vomiting.

To prevent a reaction, it is very important that you avoid soy and soy based products. Always read food labels. Completely avoiding soy based products is the only treatment. You also need to avoid some unexpected sources like Baked goods, Canned broths and soups, Canned tuna and meat, Cereals, Cookies, Crackers, Infant formulas, Processed meats, Sauces, Soaps and moisturizers. Allergens are not always a part of these foods and products, but soy can appear in surprising places so again always read label.

### **Fish Allergy**

Allergy to a specific kind of fish can be diagnose through a skin-prick test or a blood test. Common fish allergies include allergic to shellfish (shrimp, crab, lobster) or finned fish (tuna, salmon). Some allergists recommend that eating the other kind of fish you're not allergic to is sometimes safe. The allergy to a specific kind of fish can be determined through skin-prick test or a blood test. If these tests aren't definitive, you can have an oral food challenge.

An allergy to fish protein is more common & it's possible to be allergic to fish gelatin (made from fish skin & bones). People with a fish allergy should consult their allergist before taking fish oil dietary supplements.

Due to the high risk for cross-contact at the time of food preparation, it is best to avoid seafood restaurants in general, even if you plan to order something other than fish. Stay out of areas where fish is being cooked, as proteins may be released into the air during cooking.

## **Allergic Diseases and Symptoms**

Mild symptoms related to a food allergy may include sneezing, stuffy or runny nose, itchy, watery eyes, swelling, rash, stomach cramps, and diarrhea. Allergic diseases include hay fever, eczema, asthma and anaphylaxis.

### **Hay Fever**

Allergic rhinitis is commonly known as hay fever. But you don't have to be exposed to hay to have symptoms. And contrary to what the name suggests, you don't have to have a fever to have hay fever. The symptoms of hay fever include Runny nose, itchy eyes, mouth or skin, sneezing, stuffy nose due to blockage or congestion, fatigue (often reported due to poor quality sleep as a result of nasal obstruction) [4].

### **Eczema**

Rather than a specific health condition, eczema is a reaction pattern that the skin produces in a number of diseases. It begins as red, raised tiny blisters containing a clear fluid atop red, elevated plaques. When the blisters break, the affected skin will weep and ooze. In older eczema, chronic eczema, the blisters are less prominent and the skin is thickened, elevated, and scaling. Eczema almost always is very itchy. After repeated exposures to the same substance, an allergen, the body's immune recognition system becomes activated at the site of the next exposure and produces eczema. Allergic contact eczema can be cured if a specific allergenic substance can be identified and avoided [5].

## Asthma

Asthma is a chronic disease involving the airways in the lungs. These airways, or bronchial tubes, allow air to come in and out of the lungs.

If you have asthma your airways are always inflamed. They become even more swollen and the muscles around the airways can tighten when something triggers your symptoms. This makes it difficult for air to move in and out of the lungs, causing symptoms such as coughing, wheezing, shortness of breath and/or chest tightness.

People with a family history of allergies or asthma are more prone to developing asthma. Many people with asthma also have allergies. This is called allergic asthma [6].

## Anaphylaxis

In most cases, people with allergies develop mild to moderate symptoms, such as watery eyes, a runny nose or a rash. But sometimes, exposure to an allergen can cause a life-threatening allergic reaction known as anaphylaxis. This severe reaction happens when an over-release of chemicals puts the person into shock. Allergies to food, insect stings, medications and latex are most frequently associated with anaphylaxis.

A second anaphylactic reaction, known as a biphasic reaction, can occur as long as 12 hours after the initial reaction.

If you have a history of allergies and/or asthma and have previously had a severe reaction, you are at greater risk for anaphylaxis.

## Prevalence of Allergic Diseases in Pakistan

In recent times, the incidence of allergic diseases, particularly bronchial asthma, has been increasing worldwide.

Pakistan is globally sixth most populous, economically developing south Asian country with tremendously increasing trend of urbanization [7]. However, there appears to be no published data on the prevalence of allergic diseases in Karachi, Pakistan, with only limited data available among few age groups under one ISAAC study. Survey results showed that the frequency of diagnosed (previously seen by physicians) cases of asthma stood at 15.8%, while the frequency of allergic rhinitis was found to be 28.50% among these children. Other parameters that were analyzed included dry cough (20.1%), wheezing (11.7%), breathlessness (15.40%), and eczema (21.8%) [8].

## How Manufacturers Label Allergens Over Packed Foods

Most of the Food manufacturers are now following International Rules for Food Labeling to ensure that all consumers are given comprehensive ingredient listing information. So that People affected by food allergies are able to identify potential allergens quickly, easily and accurately. This is especially important for parents and caregivers of children with food allergies.

Manufacturers are using three different ways to mark allergen on their Food Product

- In the ingredient list, using the allergen's common name.
- Using the word "Contains" followed by the name of the major food allergen—for example, "Contains milk, wheat"
- In the ingredient list in parentheses, when the ingredient is a less common form of the allergen—for example, "albumin (egg)"

People with food allergies have to be extremely careful about what they eat. Food labelling is therefore very important to those with food allergies as there can be potentially serious consequences from eating food that they are allergic to [9].

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