



Review Article

A BRIEF REVIEW ON FOOD ALLERGY

Mandal Akash\*, Nama Nitin, Khinchi M.P., Singh S.P., Mahaver Megha

Department of Pharmaceutics, Kota College of Pharmacy, Kota, Rajasthan, India.

ABSTRACT

Food allergy is recognized as a common worldwide problem, and, like other atopic disorders, its incidence seems to increase. In the past years, investigations of allergic food proteins and related immunological responses have moved to the molecular level, and the newly-found knowledge might provide novel experimental strategies for the laboratory diagnosis and the immuno-modulatory control of food-induced allergic reactions. Approximately 20% of the population alters their diet for a perceived adverse reaction to food, but the application of double-blind placebo-controlled oral food challenge, the "gold standard" for diagnosis of food allergy, shows that questionnaire-based studies overestimate the prevalence of food allergies. The clinical disorders determined by adverse reactions to food can be classified on the basis of immunologic or no immunologic mechanisms and the organ system or systems affected. The true prevalence of food allergy is lower and seems to range from 1% to 4% of the general population and about 6% of the general population and about 6% of the paediatric population, but does occur in as much as 25% of children with eczema. Allergic hypersensitivity simply put, is an adverse immune reaction to a protein (or allergen) in our environment, which is normally harmless to the non-allergic person. It may present as mild itching of the skin, tissue swelling and wheezing or even progress to full-blown anaphylaxis and death.

**Key words:-** Introduction, Sign & symptoms, Types of allergic food, Classification of food allergy, Pathophysiology, Diagnosis, Treatment, Medicine, Conclusion.

INTRODUCTION

A food allergy is an immunologic response to a food protein and caused by allergens in the food that are a kind of protein in the food. These proteins resist the cooking process, the acid in the stomach and the enzymes in the stomach and intestines and enter the blood stream and they cause the allergy reaction after they enter the blood stream.

SIGNS & SYMPTOM

**Anaphylaxis:** - a severe, whole-body allergic reaction that can result in death. Leads to vasodilatation and, if severe, symptoms of life-threatening shock.

**Angioedema:** - rapid swelling (edema) of the skin, mucosa and submucosal tissues, especially of the eyelids, face, lips, and tongue.

**Eczema:** is a form of dermatitis, or inflammation of the upper layers of the skin.

- **Atopic eczema (aka infantile e., flexural e., atopic dermatitis)** :is believed to have a hereditary component, and often runs in families whose members also have hay fever and asthma. Itchy rash is particularly noticeable on face and scalp, neck, inside of elbows, behind knees, and buttocks.
- **Contact dermatitis is of two types:** allergic (resulting from a delayed reaction to some allergen, such as poison ivy or nickel), and irritant (resulting from direct reaction to a solvent, for example). Some substances act both as allergen and irritant (e.g. wet cement). Other substances cause

**Akash Mandal**  
Department of pharmacology, Kota college of Pharmacy, Kota  
Sp-1 RIICO Industrial Area, Ranpur, Kota  
Mob. 7300277764  
Email- akashmandal2795@gmail.com

a problem after sunlight exposure, bringing on phototoxic dermatitis.

- **Xerotic eczema (aka asteatotic e., e. craquele or craquelatum, winter itch, pruritus hiemalis):** is dry skin that becomes so serious it turns into eczema. It worsens in dry winter weather, and limbs and trunk are most often affected. The itchy, tender skin resembles a dry, cracked, river bed. This disorder is very common among the older population.
- **Seborrheic dermatitis (aka cradle cap in infants, dandruff):** causes dry or greasy scaling of the scalp and eyebrows. Scaly pimples and red patches sometimes appear in various adjacent places. In newborns it causes a thick, yellow crusty scalp rash called cradle cap which seems related to lack of biotin, and is often curable.

**Skin rashes:** such as nettle rash (also called urticaria or hives). Some of these longer lasting rashes are called atopic dermatitis.

**Itching** of the mouth, throat, eyes, skin, or any area

**Nausea,** vomiting, diarrhoea, stomach cramps, or abdominal pain

**Runny nose** or nasal congestion

**Wheezing,** scratchy throat, shortness of breath, or difficulty swallowing

**Mood swings,** depression

The symptoms of an Immunoglobulin E (IgE) allergic reaction can take place within a few minutes to an hour. The process of eating and digesting food affects the timing and location of a reaction. IgG reactions build over a period of hours to days, and therefore symptoms can be difficult to notice as allergy-related.

### **TYPES OF ALLERGENIC FOOD**

There are a number of groups of foods that are responsible for causing the majority of food allergies. Rice allergy is more common in East Asia where rice forms a large part of the diet. In Central Europe, celery allergy is more common. The top allergens vary somewhat from country to country but milk,

eggs, peanuts, tree nuts, fish, shellfish, soy, wheat and sesame tend to be in the top 10 in many countries.

**The most common food allergies are: -**

#### **Milk Allergy-**

The major allergens in milk are the caseins and the protein  $\beta$ -lactoglobulin. People are usually allergic to more than one kind of milk protein. The proteins from cow's milk are very similar to those from goats and sheep. Thus goat's or sheep's milk cannot be used as a cow's milk substitute in allergic individuals.

#### **Eggs:-**

The main allergens are the egg white proteins ovomucoid, ovalbumin, and ovotransferrin. The eggs of other poultry, such as ducks, are very similar to those of hens and can cause reactions in egg-allergic individuals.

#### **Peanut allergy:-**

Peanuts are one of most allergenic foods and frequently cause very severe reactions, including anaphylaxis. Allergy to peanuts is established in childhood and usually maintained throughout life. Peanut allergy can be so severe that only very tiny amounts of peanut can cause a reaction. Thus the traces of nuts found in processed oils, or the carry over of materials on utensils used for serving foods, can be enough in some individuals, to cause a reaction. The main allergens in peanuts and Soya are the proteins used by the seed as a food store for it to grow into a seedling. One of the allergens in Soya bean is very similar to a major allergen from dust mites, a common environmental allergen. We aren't sure yet whether this means there is a link between dust allergy and Soya allergy.

#### **Tree nut allergy**

This group includes true tree nuts, such as Brazil nuts, hazelnuts, walnut and pecan. Whilst not as intensively studied as peanuts, indications are that tree nuts can cause symptoms as severe which can occasionally be fatal.

Children who become sensitised to tree nuts tend to remain allergic throughout life. Hazelnut and almond allergies are more like those people get to fruit, and are linked to pollen allergies.

Nut allergens can be both destroyed by, and resistant, to cooking and we think that roasting may actually create new allergens. The allergens can be the seed storage proteins, or other molecules which are also found in pollen.

#### **Fish and shellfish allergy:-**



**Figure 1:- Fish & shellfish**

Severe reactions are more frequently found with these foods, including anaphylaxis. Cooking does not destroy the allergens in fish and shellfish, and some individuals maybe allergic to the cooked, but not raw, fish. The major allergens in fish are flesh proteins called par albumins which are very similar in all kinds of fish. Shellfish allergens are usually found in the flesh and are part of the muscle proteinsystem, whilst in foods such as shrimps, allergens have also been found in the shells.

#### **Fruits allergy:-**

In general allergic reactions to fruits and vegetables are mild, and are often limited to the mouth, and are called the oral-allergy syndrome (OAS). Around four out of ten people having OAS are also allergic to tree and weed pollens. Thus people who are allergic to birch pollen are much more likely to be allergic to apples. There allergens in fruits and vegetables are not as complicated as other foods. Many of them are very like the allergens in pollens, which is why people with pollen allergies are also allergic to certain fruits. Many fruit allergens are destroyed by cooking, and thus cooked fruits are often safe for fruit allergic people to eat.

**Tomato Allergy :-** Reported on 4 cases:- 2 adults with throat constriction, 1 child with gastro esophageal reflux disease [GERD], 1 child with atopic dermatitis with IgE-mediated reactions to tomatoes.

#### **Cereals allergy:-**

Suffered by children and adults alike, wheat allergy appears to be particularly associated with exercise-induced anaphylaxis. The more of a cereal (wheat, rye, barley, oats, maize or rice) we eat the more likely we are to suffer an allergy. Thus rice allergy is found more frequently in populations eating ethnic diets. Seed storage proteins (such as wheat gluten) and other proteins present in grain to protect it from attack by moulds and bacteria, have been found to be major allergens.

#### **Penicilline's allergy reaction :-**

Frequently manifestations are – rash, itching, urticaria and fever. Wheezing, angioneuritis, edema, serum sickness and exofolliative dermatitis are less common. Anaphylaxis is rare but may be fatal. Fear of anaphylactic shock has severely restricted the use of injPnG in general practice. All form of penicilline( natural or semisynthetic ) can cause allergy but it is more commonly seen after paranteral administration. Penicilline produce hypersensitivity – urticaria, angioedema, bronchospasm, anaphylaxis or seum

sickness. If earlier reaction had been only a rash, penicilline may be given cautiously – often no untoward effect is seen.

**CLASSIFICATION OF FOOD ALLERGY**

**Immediate Reaction Type (Skin-Sensitive or Wheal Type)**

**Antibody:** Skin sensitizing:-

**Hereditary:** spontaneous, abrupt, obvious, often severe symptoms,

Involving all major systems of body.

**Portal of entry:**

**Alimentary mucosa causes:** food by ingestion

**Respiratory mucosa causes:** Inhaled dusty airborne food dusts and volatile food odours by inhalation (rare)

**Skin causes:** food by percutaneous absorption (rare)

**By parenteral injection causes:** Therapeutic agent containing food excitants

**Nonhereditary:** Induced, anaphylactic, often severe symptoms involving all major system of body

**Portal of entry:**

By parenteral injection causes: sensitizers such as organ extracts, virus vaccines (egg media)

**Delayed Reaction Types (Skin-Negative or Non- Whealtype)**

**Antibody: unknown:-**

**Hereditary:** Deliberate, obscure symptoms involving all major systems of body

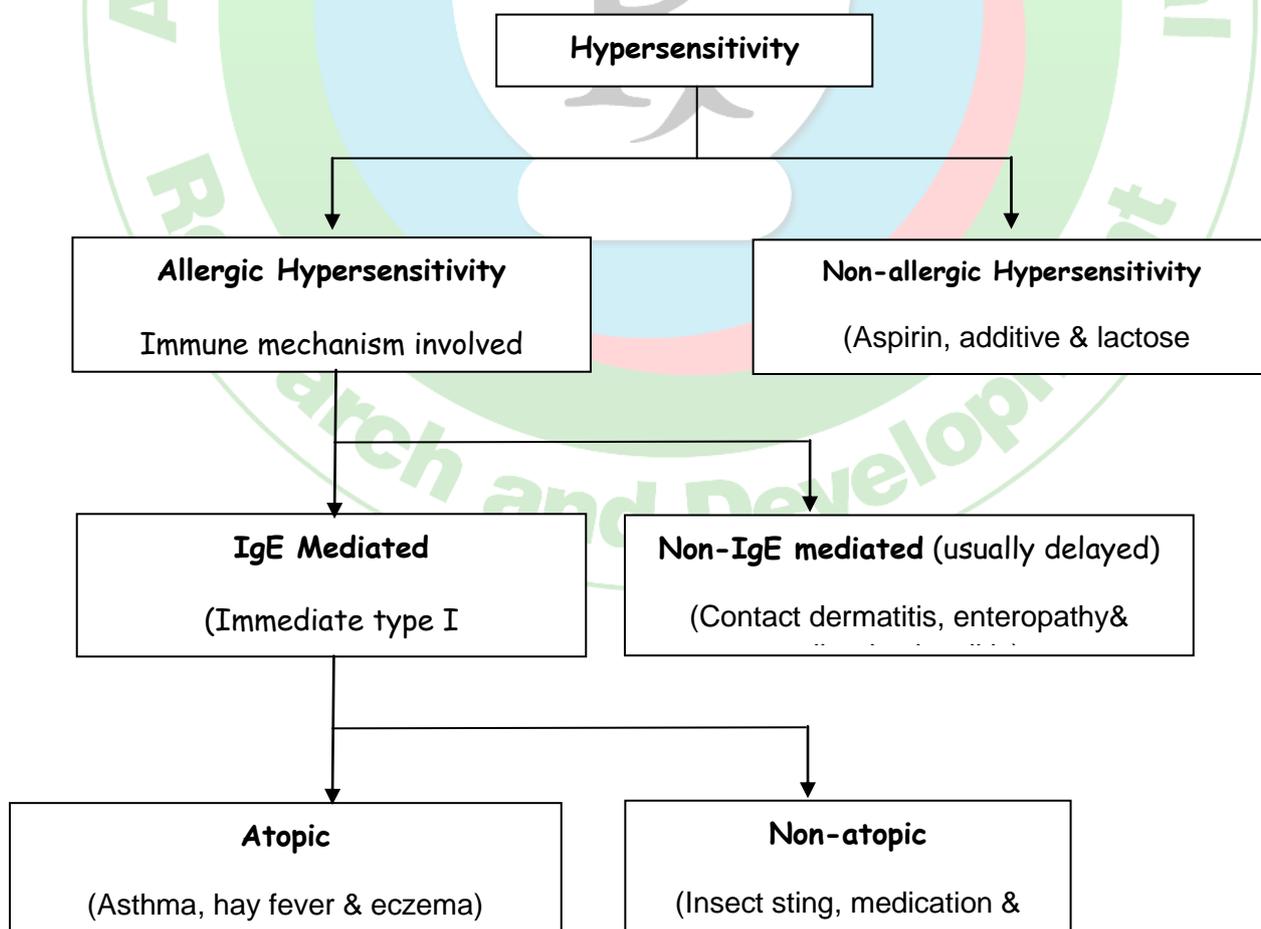
**Portal of entry:**

**Alimentary mucosa causes:** Foods by ingestion

**Nonhereditary:-** Induced (contact dermatitis), rare, involving respiratory and cutaneous systems

**Portal of entry:**

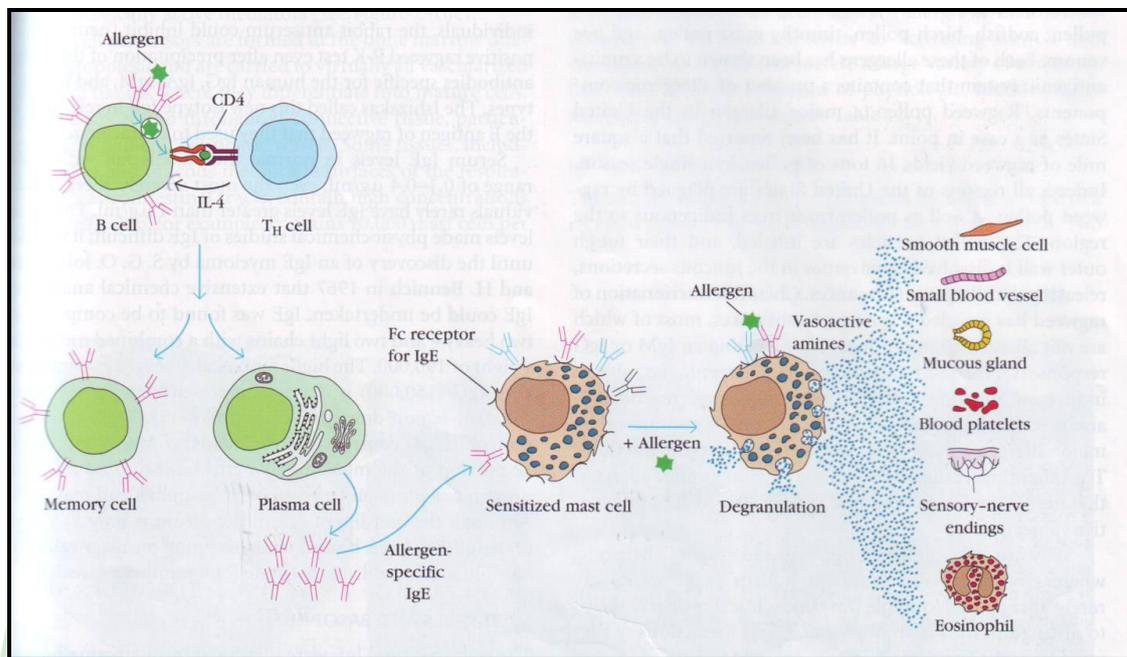
Intact oral, and buccal mucosa, and skin causes: Foods, essential oils of foods and spices



## PATHOPHYSIOLOGY

A food allergy is an immunologic response to a food protein. Food allergy is type 1 hypersensitivity reaction.

Type I Hypersensitivity is characterised by excessive activation of mast cells and basophils by IgE, resulting in a systemic inflammatory response that can result in symptoms as benign as a runny nose, to life-threatening anaphylactic shock and death.



**Figure 2. Pathophysiology**

Exposure to an allergen activates B cells to form IgE secreting plasma cells. The secreted IgE molecules bind to IgE specific Fc Receptor on mast cells. Second exposure to allergen leads to cross linking of the bound IgE triggering release of pharmacologically active mediators vasoactive amines.

In a scratch-the-skin test, a dilute extract of the suspected food is placed on the skin of the forearm or back. This portion of the skin then is scratched with a needle and observed for swelling or redness, which would signify a local allergic reaction to the food. A positive scratch test indicates that the patient has the IgE that is specific for the food being tested on the skin's mast cells.

## DIAGNOSIS OF FOOD ALLERGY

Diagnosis of food allergy is based on clinical history, skin prick tests, and laboratory tests to detect serum-food specific IgE, elimination diets and challenges.

In some highly allergic patients, however, especially if they have had anaphylactic reactions, skin tests should not be done because they could provoke another dangerous reaction. Skin tests also cannot be done in patients with extensive eczema.

### Skin Prick Tests:-

The skin prick is easy to do and results are available in minutes. Different allergists may use different devices for skin prick testing. Some use a "bifurcated needle", which looks like a fork with 2 prongs. Others use a "multi-test", which may look like a small board with several pins sticking out of it.

It is good for quickly learning if a person is allergic to a particular food or not, because it detects allergic antibodies known as IgE. Skin tests cannot predict if a reaction would occur or what kind of reaction might occur if a person ingests that particular allergen. They can however confirm an allergy in light of a patient's history of reactions to a particular food.

**Blood tests:-**

Blood tests such as the RAST (radioallergosorbent test) and the ELISA (enzyme-linked immunosorbent assay). These tests measure the presence of food-specific IgE antibodies in the blood of patients, but they cost more than skin tests, and the results are not available immediately.

**Enzyme-Linked Immunosorbent Assay (ELISA) :-**

In the ELISA system, an enzyme coupled to the antihuman IgE denatures a substrate, which either change color or becomes fluorescent. Then the amount of color or fluorescence can be measured.

**Other Laboratory Tests:-**

When evaluating patients with gastrointestinal symptoms, suspecting food

hypersensitivities, a number of other standard laboratory studies might be useful. Patients with allergic eosinophilic esophagitis and allergic eosinophilic gastroenteritis have peripheral eosinophilia, and patients with severe allergic eosinophilic gastroenteritis might have anaemia, blood in the stool, and decreased serum protein, albumin and IgG levels (with preservation of IgM and IgA). Greater than 10-20 eosinophils per 40 × high-power field in the esophagus is diagnostic of allergic eosinophilic esophagitis, especially if the pH probe is normal and there is lack of responses to antireflux medication. Eosinophils are normally present in the gastric and intestinal mucosa, and therefore eosinophil number must be greater to make the diagnosis of allergic eosinophilic gastroenteritis.

**TREATMENT****Table. 1:-Potential Immunotherapeutic strategies for the treatment of food allergy**

Therapy	Types of Allergy	Routes (S)	Immunologic Mechanism	Risk(S)
Traditional injection immunotherapy	oral allergy syndrome	Subcutaneous	Increased IgE-blocking antibodies, decrease specific IgE	Safe when performed properly
Peptide immunotherapy	IgE-mediated food allergy	Subcutaneous	Immune deviation from Th2 to Th1	Appear safe
Traditional Chinese medicine	IgE-mediated food allergy (asthma)	Subcutaneous	Immune deviation from Th2 to Th1	Appear safe
Fusion proteins	IgE-mediated (all type)	Subcutaneous	Blocks IgE-mediated	Unknown
Mutated protein immunotherapy	IgE-mediated food allergy	Subcutaneous & oral	Immune deviation from Th2 to Th1(3)	Appear safe
DNA immunization,	IgE-mediated food allergy	Subcutaneous & oral	Immune deviation from Th2 to Th1(oral) increase levels of allergen specific secretory IgA in the gut & systemic IgG	Unknown long-term
Immunostimulating sequences (ISSs)	IgE-mediated food allergy	Subcutaneous	Immune deviation from Th2 to Th1	Appear safe
Anti-IgE Therapy	IgE-mediated food allergy	Subcutaneous	Deplete IgE, blocks IgE from binding to high affinity IgE-receptor(FCεRI):down-regulation IgE receptors productions	Appear safe

**Medicine**

<b>Drugs</b>	<b>Effects and Precautions</b>
<b>Antibiotics</b>	
Cephalosporins, penicillin	Take on an empty stomach to speed absorption of the drugs.
Erythromycin	Don't take with fruit juice or wine, which decrease the drug's effectiveness.
Sulfa drugs	Increase the risk of Vitamin B-12 deficiency
Tetracycline	Dairy products reduce the drug's effectiveness. Lowers Vitamin C absorption
<b>Anticonvulsants</b>	
Dilantin, phenobarbital	Increase the risk of anemia and nerve problems due to deficiency of folate and other B vitamins.
<b>Antidepressants</b>	
Fluoxetine	Reduce appetite and can lead to excessive weight loss
Lithium	A low-salt diet increases the risk of lithium toxicity; excessive salt reduces the drug's efficacy
MAO Inhibitors	Foods high in tyramine (aged cheeses, processed meats, legumes, wine, beer, among others) can bring on a hypertensive crisis.
Tricyclics	Many foods, especially legumes, meat, fish, and foods high in Vitamin C, reduce absorption of the drugs.
<b>Antihypertensives, Heart Medications</b>	
ACE inhibitors	Take on an empty stomach to improve the absorption of the drugs.
Alpha blockers	Take with liquid or food to avoid excessive drop in blood pressure.
Antiarrhythmic drugs	Avoid caffeine, which increases the risk of irregular heartbeat.
Beta blockers	Take on an empty stomach; food, especially meat, increases the drug's effects and can cause dizziness and low blood pressure.
Digitalis	Avoid taking with milk and high fiber foods, which reduce absorption, increases potassium loss.
Diuretics	Increase the risk of potassium deficiency.

**CONCLUSION**

In conclusion, an individual suffering from food allergies needs to avoid that particular food, always carry some emergency anti allergy measures on his person and carry the information regarding a particular food allergy on his person. Information is the key to living a healthy and food allergy free life.

**Food Allergy at a Glance**

- Food allergy is not common, but can be serious.
- Food allergy differs from food intolerance, which is far more common.
- The more frequent types of food allergies in adults differ from those in children.
- Children can outgrow their food allergies, but adults usually do not.

- The diagnosis of food allergy is made with the help of the patient's detailed history, the patient's diet diary, or an elimination diet.
- Food allergy is treated primarily by dietary avoidance.

## REFERENCE

1. Ierodiakonou, D; Garcia-Larsen, et.al. (2016). "Timing of Allergenic Food Introduction to the Infant Diet and Risk of Allergic or Autoimmune Disease.
2. "Allergen Immunotherapy" 2015.
3. "Making sense of allergies" (PDF) 2015.
4. ER.;Quinonez, RA.; Moyer, VA.; Schroeder, AR. (2014). "Overdiagnosis: how our compulsion for diagnosis may be harming children."
5. Ferreira, CT.; Seidman, E. "Food allergy: a practical update from the gastroenterological viewpoint.
6. Medline Plus Encyclopedia Food allergy.
7. Food Allergies. Food Allergy Initiative. 2009.
8. "Food Allergy Facts & Figures" (2007). Asthma and Allergy Foundation of America.
9. "Food allergy and intolerance". Allergy & Intolerance. Food Additives and Ingredients Association.
10. "About Food Allergies". Food Allergy Initiative. 2008.
11. "Rice Allergy". Health Centers Online. 2006.

