

Leading Article

Some aspects of food allergy

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An adverse reaction to food could be defined as an abnormal clinical reaction related to ingestion of food¹. It could either be a true food allergy or hypersensitivity due to an underlying immunological reaction or a pseudo-allergy or food intolerance with which has no underlying immunological basis¹. The incidence of food allergies in adults is 1-2% whilst in children under 3 years of age it is between 5-8%¹. This is because some children “outgrow” their food allergies after 3 years. Incidence of cow milk protein allergy in children under 2 years is about 2.5%².

Challenge to gastrointestinal tract and immune system

The small intestine confronts an enormous amount of foreign protein, after the onset of weaning. It has to distinguish between nutrients required for growth and energy needs and foreign pathogens, which are rejected. The intestinal barrier against foreign antigens are either non-immunologic or immunologic³. Digestive enzymes, intestinal motility, surface mucus layer and brush-border cell membranes are components of the non-immunologic barrier³. The immunologic barrier consists of gut associated lymphoid tissue (GALT), secretory immunoglobulin A (SIgA) and effector cells (e.g. macrophages, mast cells and lymphocytes)³. Foreign antigens are cleared by a variety of mechanisms. SIgA antibodies prevent adherence of micro-organisms on to mucosal surface. In addition, specific antibodies produced in the submucosa activate clearance of antigens. Sometimes acquired tolerance to specific antigens prevents activation of immune responses³.

Predisposing factors for allergy

Many factors predispose to food allergy such as genetic factors, levels of IgE in cord blood, maternal tobacco smoking and maternal ingestion of highly allergenic food during the last trimester³. The risk of developing atopy based on family history of allergy is shown in Table 1.

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Table 1

Risk of developing atopy based on family history of allergy

Family history

Risk

Both parents atopic	
40 - 60%	
Both parents atopic with same manifestation	
50 - 80%	
One parent atopic	20 -
40%	
One sibling atopic	25 -
35%	
Neither parent nor sibling atopic	5 - 15%

Genetic factors are more important in determining allergy in early life, since the allergic phenotype is expressed soon after the interactions between immune system and allergens; in adults allergen-independent environmental factors are more important. Prematurity and low birth weight do not affect the development of allergy³.

Pathogenesis of food allergies

There are 3 major players in this process; the allergen, GI barrier and digestive components and the immune system³. The common food allergens incriminated are shown in Table 2.

Table 2

Common food allergens

- Cow milk proteins*
 - Caseins
 - Whey proteins
 - Beta lactoglobulin,
 - Alpha lacto globulin,
 - Bovine serum albumin,
 - Bovine immunoglobulin
- Egg proteins*
 - Ovomucoid
 - Ovalbumin

3. *Tree nuts and ground nuts*

Walnut
Hazelnut
Almonds
Brazil nut
Peanuts

4. *Soy Proteins*

5. *Fish and sea food proteins*

Shrimp
Crab
Lobster
Cod fish
Oyster
Mussels
Cockles etc.

6. *Fruits*

Apples
Pears
Cherries
Apricots
Peaches
Pineapple

7. *Vegetables*

Spinach
Tomatoes
Celery

GI food allergies could be exclusively IgE mediated, partially IgE mediated or exclusively cell mediated (non IgE mediated)¹. In IgE mediated disorders symptoms develop within minutes to 2 hours of ingestion¹. It is an example of immediate GI hyper-sensitivity and common symptoms are nausea, abdominal pain, colic, vomiting, flatulence and diarrhoea. Other target organs such as the skin and lungs may be affected. Nut allergies, including peanut allergy, are usually life-long and may result in anaphylaxis.

IgE mediated disorders

The oral allergy syndrome is IgE mediated¹. Fresh fruits, raw vegetables, tree nuts, peanuts, egg, milk and fish are associated. Symptoms are almost exclusively confined to the oropharynx and consist of pruritus, tingling, angio-oedema of lips, tongue, palate and throat, of rapid onset¹.

Mixed IgE and non-IgE mediated disorders

These consist of many disease entities such as eosinophilic oesophagitis, gastritis and gastroenteritis, which may manifest from infancy up to adolescence⁴. Symptoms include intermittent vomiting, food refusal, abdominal pain, dysphagia, irritability, sleep disturbance

and gastro oesophageal reflux. There is peripheral eosinophilia in 50% of patients and on biopsy eosinophilic infiltration of the oesophagus, stomach and intestinal walls becomes evident⁴.

Exclusively cell-mediated disorders (non-IgE mediated)

There is a variety of exclusively cell-mediated disorders. These are dietary protein enterocolitis syndrome, dietary protein proctitis/ proctocolitis syndrome, dietary protein enteropathy and the well-documented coeliac disease⁵. In proctitis / proctocolitis syndrome, manifestations are seen in early infancy and includes blood streaked stools and anaemia¹. Such babies may be breast-fed, or formula fed with cow milk or soya protein based formulae.

In dietary protein enteropathy, infants are predominantly affected and clinical manifestations include protracted diarrhoea, vomiting, failure to thrive, abdominal distension, malabsorption, anaemia, oedema and hypoproteinaemia¹. Coeliac disease due to gluten sensitivity is a classic example⁶. Other food allergens include cow milk, soya, egg, rice, fish and chicken.

Coeliac disease

Ingestion of gluten (found in wheat) results in subtotal or total villous atrophy and hyperplasia of crypts of small intestine. Protracted diarrhoea, malabsorption, steatorrhoea, abdominal distension and failure to thrive are common clinical manifestations⁶. Antigliadin and antiendomysium antibodies are detected in the serum in 90% of patients⁶. A gluten-free diet should be prescribed life-long. It is associated with HLA – DQ2(&DQ8) haplotype⁶.

Cow-milk protein allergy

It is due to β 2 lactoglobulin and is associated with consumption of pasteurized cow milk. Manifestations are seen usually below 6 months of age and include gastrointestinal blood loss, anaemia and chronic constipation. Usually children grow out of it by 2 to 3 years of age².

Differential diagnosis of gastro intestinal food allergies

As symptoms of food allergies are non specific, differential diagnosis includes other diseases with similar symptoms such as poisoning, acute gastroenteritis, gastro-oesophageal reflux, and ascariasis. Therefore a high degree of suspicion plays an important role in diagnosis coupled with a detailed, relevant history.

Diagnosis of food allergy

In the past, a variety of investigations such as skin prick tests, atopy patch tests, RAST and serum IgE levels have been used⁷. These tests are not very helpful. Double blind, placebo controlled food challenge (DBPCFC) is considered to be the gold standard for diagnosis⁸. However DBPCFC is very tedious in practice and carried out only in a few specialized centres. As mentioned before, a detailed relevant history coupled with a high degree of suspicion plays an important role in clinical situations.

Management of food allergies

If the allergen is identified, it should be withdrawn. If not, a vegetarian diet, free of animal proteins and artificial food additive should be prescribed. Symptomatic relief would be obtained with antihistamines and steroids. Once patient is free of symptoms, the withdrawn dietary items should be re-introduced gradually one at a time. If symptoms recur on re-introduction, the offending dietary item should be withdrawn⁹.

Preventive measures

These include promotion of breast feeding, avoiding weaning during the first 4 to 6 months, avoidance of aeroallergens, air pollution and passive smoking.

Food intolerance or pseudo – food allergies

Pseudo allergies have no immunological basis even though they may display similar clinical features¹. The offending items are shown in Table 3.

The code for food additives is usually displayed on the label; in susceptible patients, extra care should be taken by reading the labels carefully, and avoiding potential harmful agents.

Table 3
Food additives

- *Foods containing histamine or releasing histamine*
Fresh or Canned tuna, mackerel,
- *Preservatives*
Sulphites and derivatives E220 – 227
Nitrites E249 - 252
Benzoic acid and derivatives E210 – 219
Sorbic acid
- *Antioxidants*
Butyl – hydroxyanisole E 321
Butyl – hydroxytoluene E 321

- *Colourings*
Tartrazine E102
Yellow orange E110
Azorubine E122
Amaranth E123
Cochineal red E124
Eythrosine E127
Brilliant black BN E151
- *Flavourings*
Glutamates B 550 – 553
- *Whitening agents*
Potassium bromide E 924
Chlorine E 925

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