Review
Food allergy in infants & children
Gastrointestinal Food Allergy and Food Intolerance in Infants and Children - Practical aspects

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Gastrointestinal Food Allergy and Food Intolerance in Infants and Children - Practical aspects

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TERMINOLOGY

- **Food allergy** is an abnormal response to food triggered by the body’s immune system. IgE or non-IgE mediated.\(^1\)
- **Atopy** is the term referred to a characteristic that makes one susceptible to various allergies.\(^2\)
- **Food allergens** are proteins in food which cause allergic symptoms.\(^3\)
- **Food intolerance** is another type of unpleasant reaction to food which is more common than food allergy. This is not mediated by the immune system.\(^4\)

**Introduction**

Food allergy prevalence among the paediatric population is perceived to be increasing. Like other atopic disorders, food allergies have increased over the past three decades. 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 2 years of age are more likely to develop food allergies than are older children or adults.

A wide range of symptoms has been attributed to food allergy. Skin, respiratory, cardiovascular and gastrointestinal symptoms may express during an allergic reaction. Most frequently affected are the skin and respiratory systems. Urticaria, angioedema and flushing are skin symptoms. Respiratory symptoms include nasal congestion, rhinorrhea, nasal pruritis, sneezing, laryngeal edema, dyspnea and wheezing. If the gastrointestinal tract is involved, oral pruritis, angioedema, nausea, abdominal pain, vomiting, diarrhoea may occur. Food-induced anaphylaxis is an acute, often severe and sometimes fatal immune response that usually occurs within a limited time following exposure to an antigen.

Exposure to an antigen is a prerequisite for the development of food allergy. The initial exposure can occur prenatally or postnatally. Postnatal sensitization may occur with exposure to food allergens by inhalation, skin contact or ingestion. Food allergen sensitization can happen with a food antigen in breast milk. Eggs, milk, peanuts, tree nuts, fish and wheat account for approximately 90% of food allergies in childhood. Food allergy is estimated to affect 1-2% of the whole population, however its prevalence in children is quite high. Unfortunately there is not much awareness about food hypersensitivity reaction in India. Indian food is quite complex and it is necessary for a high-risk person to be aware of the food he / she is allergic to. Paucity of published data on food allergy and food intolerance in our country necessitates that case based- clinical aspects of this subject be highlighted for improving our existing knowledge and creating an awareness to suspect this entity in our day- to - day clinical practice. An earnest attempt is made by the authors to provide an overview of the clinical presentation of food allergy and food intolerance in children and brief outline of management based on available scientific evidence. It is suggested that further reading of the following references will clarify the doubts, if any, on this subject.
COMMON FOOD ALLERGENS

In young children the most common causal foods are Cow’s milk protein (beta / alpha lactoglobulin, casein + 25 other proteins), Soya protein (co allergy with other food proteins), fish, wheat, egg white (beware of chick embryo vaccine reaction), yolk is not an antigen, citrus fruits (HAAD), peanuts, cocoa, peas (HAAD - Hyperactive Airway disease), spices and yeast, ingredients of Chinese cooking (ajinomoto or monosodium glutamate). In adults and adolescents the most common causal foods are shell fish, peanut, tree nuts and fish and appear to be generally permanent. Early childhood allergy to milk, egg, soy and wheat usually resolves around school age (approximately 80%).5,6,7

Clinical Classification:

<table>
<thead>
<tr>
<th>IgE mediated</th>
<th>Mixed</th>
<th>Non IgE mediated (T cell mediated)</th>
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<tbody>
<tr>
<td>Immediate GI</td>
<td>Eosinophilic esophagitis &amp; eosinophilic gastroenteritis</td>
<td>Dietary protein enteropathy</td>
</tr>
<tr>
<td>Hypersensitivity</td>
<td></td>
<td>Protein induced enterocolitis &amp; proctitis</td>
</tr>
<tr>
<td>Oral allergy syndrome</td>
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</table>

All the above immune system responses are to specific protein. It leads to pathologic inflammatory changes in the gastrointestinal tract.

Gastrointestinal Symptoms include diarrhoea, vomiting, dysphagia, constipation and gastrointestinal blood loss. The most common gastrointestinal food induced allergic disorders are the pollen allergy syndrome (oral allergy syndrome), allergic eosinophilic esophagitis, allergic eosinophilic gastroenteritis, food protein induced enterocolitis, proctocolitis, and enteropathy, celiac disease, infantile colic and gastrointestinal anaphylaxis3 and these will be discussed separately below. The discussion will also include cutaneous, (acute urticaria and angiooedema, atopic dermatitis and dermatitis herpetiformis) respiratory (rhino conjunctivitis and bronchial asthma) and systemic food induced allergic disorders (generalised anaphylaxis and food associated exercise induced anaphylaxis). Nonallergic food hypersensitivity (toxic, pharmacologic, metabolic disorders and idiosyncratic responses) is beyond the scope of this review.3,8,9

Pollen - Food allergy syndrome (oral allergy syndrome):

IgE-mediated food adverse reaction is more in infancy

Plant -derived food proteins (melons in individuals with ragweed allergy, apples, peaches and cherries in those with birch pollen allergy) are responsible for allergy Initially, there is sensitization via respiratory route to pollens containing proteins, it is homologous to those found in particular fruits and vegetables

Prompt oral pruritus & angioedema of lips, tongue & palate is seen on ingesting certain fresh fruits & vegetables. No systemic reactions are observed.
Diagnosis is based on clinical history, positive skin prick test, response to fresh food and relevant airborne protein and oral challenge is positive with fresh food and negative with cooked food.¹⁰,⁸

**Allergic eosinophilic esophagitis**
- IgE- or non IgE mediated or both. This is an adverse reaction to food.
- Abnormal Th2 cytokine (IL-4,5) & Chemokine response occurs.
- The symptoms are early satiety, intermittent vomiting, recurrent abdominal pain, dysphagia, blood loss in the stool, iron deficiency anemia, PLE (Polymorphic light eruption) with peripheral blood Eosinophilia. This is often treated as GOR / GERD (Gastroesophageal Reflux disease)

**Diagnosis is made by the following criteria**

<table>
<thead>
<tr>
<th>Clinical history</th>
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<tr>
<td>Skin prick test</td>
</tr>
<tr>
<td>Endoscopy with biopsy (&gt; 20 eosinophils / hpf)</td>
</tr>
<tr>
<td>Elimination diet and challenge</td>
</tr>
</tbody>
</table>

Treatment is based on elimination of the causative food from diet, oral /high dose inhaled steroids, chromolyn & leukotriene antagonists.³⁹

**Food protein-induced enterocolitis, proctocolitis, and enteropathy**
- Non-IgE type 1V immune mechanisms (T cell mediated)
- Infants before 3 months of age & resolves by 1-2 years.
- Provoked by food proteins in maternal breast or cow’s milk or soy protein based formula

Clinical presentations include nausea & vomiting which begin about 1-3 hours after allergen ingestion,
abdominal distension, flatulence, diarrhoea (steatorrhoea) sometimes with dehydration, acedemia, methaemoglobinemia, weight loss and blood in stool or occult blood. In these patients, skin prick test responses are negative. Endoscopy and biopsy are often required and reveal a patchy villous atrophy, a prominent mononuclear round cell infiltrate and few eosinophils. Elimination of food proteins leads to the clearance of symptoms in 24 to 72 hours. Food challenge induces recurrent vomiting and bleeding within 72 hours.3,11,12,10

Celiac Disease10

Celiac disease represents an immune response to food protein (gluten) and therefore may be considered a food allergy disorder

• Sensitivity to gliadin found in wheat, rye & Barley- immune response is seen after 1 year of age and often the clinical presentation is multifaceted.

• **Classic form in infants**: More extensive enteropathy- vomiting, diarrhoea, anorexia, abdominal distension, malabsorption syndrome, protein losing enteropathy and failure to thrive.

• **Atypical form in older age**: Anemia (iron deficiency), Irritable bowel syndrome (IBS) like symptoms, +puberty delay/short stature and growth failure and osteoporosis

• Celiac disease and comorbid diseases:

One must look for comorbid diseases like iron deficiency anemia, short stature and osteopenia secondary to malabsorption, auto immunity related dermatitis herpetiformis, autoimmune thyroiditis, IDDM (Insulin Dependant diabetes mellitus), autoimmune hepatitis, alopecia, dental enamel defects, ataxia, idiopathic dilated cardiomyopathy, infertility, multiple miscarriages, and biliary cirrhosis

• Or others like Down's syndrome, Turner syndrome, Williams syndrome, IgA deficiency or risk of malignancy.14

**Diagnosis of celiac sprue**:

| Anti-gliadin, Anti- transglutaminase & Anti- endomycial antibodies detection. |
| Endoscopy & biopsy |
| HLA-DQ2 / DQ8 associated genetic testing |
| Elimination diet with resolution of symptoms & food challenge, if necessary. |

**Diet in celiac disease**

Celiac disease or gluten sensitive enteropathy is an immune-mediated enteropathy triggered by the ingestion of gluten in genetically susceptible individuals. The threshold for gluten sensitivity varies. Current proposed guideline refers gluten free as ‘No Gluten’ and 200ppm (200 mg/kg) is regarded as low gluten. The diet should completely exclude the following food substances for lifetime;

Wheat and wheat products, Barley (Jow), Rye (Jav), Malt and Oats were thought to contain gluten, but now it is proven to be safe. However, contamination of oats during harvesting and milling is common.
Alternative diets:
In major part of North India, people do not consider a meal to be complete without chapatti. A wide range of natural gluten free flours which can substitute wheat have been identified.

Rice flour, Soyabean flour, Chick pea flour (chane ka atta), Black gram flour (Besan), Bajra ka atta, Makke ka atta, Tapioca (Shimla aloo flour), Water chestnut flour (singare ka atta), Buckwheat flour (kottu ka atta) and Jowar are some available options.

Unfortunately, commercial gluten free flours are not available in our country. Imported gluten free flours are now available but only in expensive outlets.

A huge list of foods other than those mentioned above, can be eaten freely and this is specifically read out to the carers and the patient.

<table>
<thead>
<tr>
<th>Rice, murmura (puffed rice), chirwa, arrowroot, sabutdana</th>
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</thead>
<tbody>
<tr>
<td>All pulses and their flours, all vegetables and fruits, milk and milk products,</td>
</tr>
<tr>
<td>Animal products like egg, meat, fish, chicken.</td>
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</tbody>
</table>

Monitoring Gluten free diet:
On diagnosis, most children suffering from celiac disease are anorexic and malnourished and need a high calories -120 -150 Kcal/ kg/day, high protein - 3g/kg with all micro nutrient supplements upto 2-3 times RDA (Recommended Dietary Allowance). Nutrient adequacy (calories and proteins particularly) is assessed by meticulously administered 24 hour recall method by a trained nutritionist.

A team approach consisting of the family physician, gastroenterologist, nutritionist and if needed psychologist is ideal and essential to convince the parents and other members of the family regarding the disease, the relevance of tests performed on the child, the association of the disease with the protean symptoms, consequences and the quality of child's life if the dietary modifications and restrictions are not followed.

The caregivers and patients must be made to understand immediate and long term effects of consuming gluten: poor physical growth, delayed pubertal development, early onset of associated autoimmune conditions, primary infertility and risk of malignancy which is often overlooked while planning the treatment of celiac disease.

Chinese Restaurant Syndrome:
There is a sensation of warmth and burning over the scalp and shoulders, headache, stiffness, weakness of limbs etc. following ingestion of chinese food due to the Mono Sodium Glutamate (Ajinomoto), which is a common ingredient of Chinese food. This may precipitate asthma.8

Infantile colic:
Infants who experience symptoms of CMA (Cow's milk allergy) have a high rate (44%) of colic and hypoallergenic formulas are more efficacious for colic than antacids or low lactose formula.10,15
Gastroesophageal Reflux and Cows milk allergy:
On the basis of studies using cows milk elimination and challenge it is clear that a subset of infantile gastroesophageal reflux is attributable to cows milk allergy in 16% to 42% of infants. Risk factors for milk being causal seem to include esophagitis, malabsorption, diarrhoea and atopic dermatitis.\textsuperscript{10,16}

Gastrointestinal Anaphylaxis
It is an IgE - mediated reaction, food associated, not exercise induced characterised by rapid onset of nausea, vomiting, cramps, abdominal pain and diarrhoea, often involving other target organs such as skin and respiratory tract. Diagnosis is established according to the clinical history, positive skin prick tests or radio allergosorbant tests (RAST) responses and if necessary based on oral challenge.\textsuperscript{3,17}
**Treatment** : Adrenaline / Steroids / Fluids / Bronchodilators

**Cutaneous and respiratory food induced allergic disorders**

IgE, non-IgE and mixed IgE adverse reactions to food can induce a variety of cutaneous disorders. The most common cutaneous disorder of food induced allergic reaction is acute urticaria and angioedema (symptoms lasting for less than six weeks) whereas food allergy causes infrequently chronic urticaria and angioedema (symptoms lasting more than six weeks).18,19
Atopic dermatitis

It is a form of eczema beginning in early infancy generally, characterised by typical distribution, extreme pruritus and a chronically relapsing course. In one-third of the children with moderate to severe disease, food allergen specific serum IgE antibodies against cow's milk, egg soya and wheat are demonstrable and the ingestion of specific food might evoke marked cutaneous lesions.20
COW’S MILK PROTEIN ALLERGY (CMPA):
The diagnostic criteria include

1) Positive modified Goldman’s criteria viz; High degree of Clinical suspicion of CMPA and abnormal histology (small bowel or rectal mucosal biopsy)

2) Milk and Milk product elimination/challenge to the child/breast feeding mother what ever the type of presentation may be.

3) Positive Skin prick test to cow's milk antigen- reaction of more than 3mm.

4) Positive milk specific IgE antibodies by ELISA or RAS or Immuno CAP Specific IgE blood test. Non-IgE (T-Cell mediated) / Mixed type appears to be a more common presentation than IgE type in our experience and most of children with CMPA outgrow the disease by 4 years of age.

LACTOSE INTOLERANCE - This is a separate clinical entity in children which needs to be differentiated from cow milk protein allergy.

Among the Congenital, secondary and late onset types, secondary type is the most common. This presents at any age and is often seen secondary to post viral diarrhoea, antibiotics and food allergy eg; celiac disease, Crohn’s, giardiasis and severe PEM (Protein Energy Malnutrition) due to villous atrophy.

Diagnosis of lactose intolerance includes:

1. Suggestive clinical setting

2. Positive stool examination (liquid part) pH +ve < 6, reducing substance of >1% in a neonate and >.5% in older child.
3. Lactose tolerance test or Lactose breath hydrogen test are of academic interest only.

4. Milk / Milk products elimination and challenge testing is recommended and the disease is managed by dietary milk reduction mostly and there are very few indications for total stoppage of milk for short duration. It is strongly recommended not to stop breast feeding without any basis.

Factors that may exacerbate a Leaky Gut are:
- Low levels of secretory IgA, Stress, Parasites, Imbalanced gut flora, Mucosal injury due to infection or certain medical drugs e.g. NSAIDS
- Lack of variation in the diet eg too much gluten
- Low stomach acid and/or pancreatic enzymes
- Poor nutrient status

Breaching the gut barrier may be due to:
Gut barrier dysfunction in gastrointestinal disease is an evolving concept and thought to be implicated in

- Crohn’s disease,
- Celiac disease,
- Food allergy,
- Acute pancreatitis and it may be a primary disease mechanism.22

The Role of Gut Flora
Gut flora plays an important part in the mediation of allergies and intolerances. Patients with disrupted flora show increased symptoms compared to those with balanced gut flora.

Treatment with probiotics have been shown to reduce symptoms of reactions.23,24

Autism and Intolerance an immune/genetic problem
- An elevated level of hypersensitivity to specific groups of foods such as casein and gluten has led to the postulation of immunogenetics theories in autism, which mainly involve genes of the histocompatibility major complex.25

Microarray Food allergy testing
It is accurate, precise in reproducibility, discriminates between positive, negative and borderline reactions. As a finger-prick collection, it is relatively Pain Free and the risk is low as diet manipulation is all that is required.

High numbers of foods are tested at a relatively low cost and the usefulness is obvious when patient response is assessed.
Benefits of Microarray food allergy testing:

Test can be performed on whole blood, plasma or serum
Only 5mcl (microlitre) of sample volume is required.
1 Slide can test 16 patient samples
64 samples can be assayed in 2 hours
Results are available in less time than standard ELISA
It is a robust test.

Cow’s milk protein allergy - diagnostic considerations:

| High index of suspicion (history/clinical) |
| Skin prick test- Positive - Induration > 3mm |
| Food elimination & challenge test |

Modified Goldman’s criteria include:

A) Clinical suspicion of CMA
B) Abnormal histology (small bowel / rectal)
C) Symptomatic response to milk free diet & Repeat biopsy reveal normal histology
   Repeat challenge after 1 year, if milk intolerant, milk free diet & repeat milk challenge annually

Food protein allergy - what is new in the diagnosis?

Genarrayt 200 Immunoassay Food IgG Kit of Genesis Diagnostics is based on microarray technology, originally invented for studying DNA and GENE expression, Genesis is now extending this technology to practical diagnostic tests, the first being a test for detecting IgG in the study of intolerances to over 200 foods

CMPA: Some useful practical points:

- CMPA is not equal to lactose intolerance:
- CMA is an immune reaction to milk protein (all or none phenomenon)
- CMA presents as GI / Respiratory Skin manifestations & Failure to Thrive
- Recovery occurs by 3 - 4 years of age
- Diagnosis is by milk elimination/ challenge
- Avoid all milk & milk products from the diet

Elements suggesting food allergy as a cause of gastrointestinal disease:

1. Temporal relationship of characteristic symptoms to particular food
2. Exclusion of anatomical, metabolic, infectious and other inflammatory causes
3. Pathologic finding consistent with allergic cause (eg: eosinophilia)
4. Confirmation of a relationship between the ingestion of the specific dietary protein and symptoms by clinical challenges on repeated exposures
5. Evidence of food specific IgE antibody in settings of IgE mediated disease
6. Associated atopic disease (atopic dermatitis and asthma)
7. Failure to respond to conventional therapies aimed at anatomical, functional, metabolic or infectious causes
8. Improvement in symptoms with elimination of the causal dietary protein
9. Clinical response to treatment of allergic inflammation (corticosteroids)
10. Similarities to clinical syndromes either proved or presumed to be caused by immunologic mechanism
11. Lack of other explanations for the clinical allergy like reaction

Laboratory tests used in the evaluation of food allergy in gastrointestinal disorders:

- Primary test for specific IgE antibody to particular foods as indicated
- RAST (radio allergo sorbant test)
- Prick /puncture skin test
- Adjunctive tests
- Endoscopy/biopsy/ Capsule endoscopy
- Absorption studies
- Stool analysis (heme, leucocytes, eosinophils)
- pH probe

The above tests are selected on the basis of individual disorders/ symptom complexes.

Specific clinical scenario that may warrant evaluation for food allergy or intolerance:

1. Immediate gastrointestinal responses (oral pruritus, vomiting and diarrhoea) after ingestion of particular food
2. Mucus or bloody stools in an infant
3. Malabsorption / protein losing enteropathy
4. Subacute/chronic vomiting, diarrhoea, or dysphagia
5. Failure to thrive
6. Gastrointestinal symptoms in a patient with atopy (eg: atopic dermatitis)
7. Gastrointestinal reflux disease recalcitrant to typical therapies
8. Infantile colic poorly responsive to behavioural intervention
9. Chronic constipation recalcitrant to typical management
Lactose intolerance - some useful practical points:

Clinical features of lactose intolerance:

Lactose intolerance is due to lactose malabsorption (relative phenomenon)

- Presentation is with GI (Gastrointestinal symptoms) only.
- Failure to Thrive is not present in secondary type; it is present only in primary disease
- Recovery occurs in few days to weeks
• Response to dietary milk reduction often for few days / weeks

Lactose intolerance - laboratory diagnosis:

| Stool liquid pH 6 |
| Reducing substance 1% in neonate & > 0.5% in older child |
| Lactose withdrawal and challenge test |
| Lactose tolerance test with 2g / kg oral lactose - blood glucose |
| Rise < 20mg/ dl over basal |
| Lactose breath hydrogen test - H2 rise > 20ppm over basal |

Management of Food Allergy: Most important, the mother must be advised to breastfeed and avoid supplementing with infant formula or offering solids for at least the first six months and to consider hypoallergenic infant formula.

Diet: Elimination Strategy

It is advisable to avoid food known to cause adverse reaction. Monitor diet carefully while eating food of the same ‘food family’. Scrutinize menus & labels for hidden allergens. Child with food allergy should carry his/her own food while attending picnics and parties to avoid accidental ingestion of allergen.

| Drug Therapy |
| Mast cell stabilizers (Terfenadine, cetirizine, sodium chromoglycate) |
| Immunotherapy injection - No proven value |
| Oral / skin desensitization - No proven value |
| Oral / high dose inhaled Steroids in eosinophilic gastro-enteritis & parenteral Epinephrine in anaphylactic shock |

Novel therapies

• For IgE mediated food allergy - sc injection of Humanised IgG antibodies (TNX-901) - especially for peanut allergy.

• Another anti IgE preparation (Omalizumab) for persistent allergic asthma

• Allergen specific immunotherapy for pollen induced rhinitis / Engineered proteins lacking IgE-binding sites & chimeric molecules & Sublingual immuno therapy

• Probiotics for treatment & prevention,

Preventive Strategy

For high risk infants with a history of family atopy exclusive breast feeding is advised for at least 6 months. The parents must use completely hydrolyzed formula as an alternative. Late introduction of solids after 6 months is advised. They must avoid cow’s milk & egg for first 12-24 months (Goat milk preferred). Mother has to avoid food allergens during pregnancy & lactation (Cow’s milk & products, egg, beef, peanuts & fish)
Oral disodium chromoglycate Oral ketotifen may be given, if required

**To prevent food allergy,** advise to the patient is exclusively breastfeed your child until 6 months of age. Introduce cereals next - rice is the safest. Introduce cooked vegetables, pulses, boiled potato, mashed banana and cooked apple, home made kanji, khichdi / pongal

**If family history of allergy is positive** exclusive breastfeeding for 6 months Avoid cow's milk until 1 yr, avoid Egg until 2 yrs of age and avoid peanuts and fish until 3 yrs of age.

Food allergy is commoner in children than in adults!! Common allergens are cow's milk, egg, soya, nuts & fish. Allergy to milk and egg is usually outgrown. Allergy to nuts and shell fish is usually lifelong and could be dangerous!! Exclusively breastfed children are less prone to allergy. Consider celiac disease in a North Indian child with diarrhea, anemia and FTT (Failure to thrive) and view such a child with high degree of suspicion in south.

Milk restricted diet can be given if breast milk is not tolerated. Whole milk is better than skimmed milk, milk with cereals and yoghurt is preferred. Calcium, minerals and vitamin supplements as supports help in therapy.

**Commercial formulas often used in CMPA and Lactose intolerance**: 

<table>
<thead>
<tr>
<th>Formula</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Prosoyal</strong></td>
<td>(soya protein + maltodextrin = lactose and sucrose free)</td>
</tr>
<tr>
<td><strong>Zerolac</strong></td>
<td>(soya protein + maltodextrin = lactose and sucrose free)</td>
</tr>
<tr>
<td><strong>Nusobee Soya</strong></td>
<td>(soya protein+ maltodextrin= lactose and sucrose free)</td>
</tr>
<tr>
<td><strong>Nusobeee Casein</strong></td>
<td>(soya+ casein+ maltodextrin+ sucrose = lactose free)</td>
</tr>
<tr>
<td><strong>Simyl MCT</strong></td>
<td>(casein+ maltodextrin = lactose and sucrose free)</td>
</tr>
</tbody>
</table>

**Case scenario - 1**

- 8 month old girl brought with a history of bloody diarrhea
- Admitted and treated for colitis with taxim and metrogyl twice, but bleeding did not stop
- PR: normal, not constipated
- Meckel’s scan negative
- ? Polyp
- Referred for colonoscopy

**History:** Breast fed until 5 months of age

- Introduction of Lactogen at 5 months - had vomiting and hence discontinued
- Introduced Cerelac at 6 months - had diarrhea and hence suggested soy formula
- Introduced Aavin and biscuits at 7 months of age - manifested with bleeding
- No skin rashes - but had mild eczema
• No wheeze
• Mosquito bite allergy

Diagnosis: Colonoscopy

• Rectal mucosal biopsy revealed numerous eosinophils/ HPF
• IgE cow’s milk protein Ab - moderate positive

Case scenario 2

• 4 month old girl brought from Bengal
• Exclusively breast fed
• Mother noticed tiny spots of blood in stool
• Passing formed stool, mild mucus
• Not constipated
• Seen by pediatric surgeon.
• PR: normal, no fissure
• Meckel’s scan negative
• Counselling for a colonoscopy
• Diagnosis: IgE cow’s milk Ab - negative
• Colonic mucosal biopsy revealed > 10 eosinophils/ HPF
• Sensitization through breast milk
• Very good improvement when mother went off dairy product
Case Scenario 3

- 17 day old boy brought with a history of passing blood in stool
- Well looking, afebrile, no organomegaly
- EBF child (Exclusively breast Fed child)
- Given vitamin K at birth
- Stool microscopy: 4-5 pus cells; plenty of RBCs
- Started on i.v antibiotics, vit K - no response
- Pediatric surgical opinion - Meckel's scan negative
More than 25 eosinophils/HPF

Case scenario 4
- 11/2 year old well growing child brought with recurrent diarrhea
- On aavin and other dairy products - perianal excoriation
- Past history of dysentery at 7 months of age
- Has mild dry skin, no eczema or asthma
- Diarrhea improved on milk free diet
- Represented with dysentery after 3 months, after reintroduction of milk. No response to cefixime.
- Rectal biopsy confirmed CMPI (Cow’s milk protein intolerance)
- Why didn't I suspect it earlier?
- A high degree of suspicion is needed
- Patients visit us when well in between
- Shift doctors
- Our mind set is to suspect CMPI in the setting of bleeding, but not otherwise
- Parents consent to endoscopy when there is bleeding, but not for recurrent diarrhea
Case scenario 5
- day old infant presented with vomiting and minor UGI (upper gastrointestinal) bleed
- Exclusively breastfed child
- Suspected GOR (GastroOesophageal Reflux)
- No response to twice daily i.v pantoprazole x 4 days and domperidone

- Introduced soy formula - developed severe diarrhea
- Started on rice based powder, mother went off dairy completely - improved dramatically

Case Scenario 6
- 8 month old child introduced to aavin milk
- Develops urticarial rash immediately within 30 minutes, no wheeze.
- Settles down on antihistaminics
- Re-challenge with icecream on another day elicits same response
- Clinically: IgE mediated response
- RAST, IgE specific Ab by immunocap, SPT
Case distribution by symptoms

- 3 month old infant initially breast fed now on top feeds
- Irritable after feed
Frequently vomits
Gaining weight well
Clinically: Probable GOR
No response to PPI/domperidone
? Infantile colic

Is this CMPI?

**CMPI and lactose intolerance: Basic differences**

<table>
<thead>
<tr>
<th></th>
<th>Immune mediated</th>
<th>Non immune mediated</th>
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</thead>
<tbody>
<tr>
<td>All or none phenomenon</td>
<td>All or none phenomenon</td>
<td>Relative phenomenon</td>
</tr>
<tr>
<td>GIT</td>
<td>50 - 80%</td>
<td></td>
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<tr>
<td>Respiratory</td>
<td>20 - 40%</td>
<td>Only GIT manifestations</td>
</tr>
<tr>
<td>Skin</td>
<td>4 - 25%</td>
<td></td>
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<tr>
<td>Diagnosis - Elimination/challenge,</td>
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<tr>
<td>Milk specific IgE/ skin tests,</td>
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<tr>
<td>Eosinophils in GI mucosa</td>
<td>Stool pH/ reducing substance</td>
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<tr>
<td>Stop all milk products</td>
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<tr>
<td>Resolves by 3-4 yrs</td>
<td>Most respond to milk reduction for 3-4 weeks</td>
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**Summary and Conclusion**

Up to 6% of our pediatric patients are likely to have food allergy. High degree of suspicion is necessary when screening such patients for diagnosis.

Food allergy and food intolerance can be differentiated both clinically and by laboratory tests. Food allergy can present as immediate or delayed hypersensitivity reaction and IgE or non-IgE mediated. We found that non-IgE mediated type appears to be more common in our set up. The various clinical spectrums of allergic manifestations in children are sub classified and briefly discussed. The case scenarios are given with a view to help pediatric and general physicians to be aware of this clinical entity and handle such cases not only with confidence but also to consider timely referral for further work-up whenever necessary. Sophisticated laboratory tests are of only academic - research importance.

Genarrayt Microarray 200+ Food IgG Kit (Australian Biologics- Microarray Test) is claimed to be accurate, reproducible and high numbers of foods are tested at a relatively low cost and is expected to benefit food allergy prone patients when the patient response is assessed.
Avoidance of causative food substances such as milk and milk products up to 3 to 4 years of age in cow’s milk protein allergy patients is recommended as majority of these children overcome this problem by this age. Fish and peanut allergy are likely to be lifelong. Post viral diarrhea induced lactose intolerance is often self-limiting and breast-feeding need not be stopped; low milk with addition of cereals and oral zinc will relieve the symptoms.

The risk of developing food allergy depends on heredity, exposure to a food (antigen), gastrointestinal permeability and environmental factors such as microbial exposure. Heredity is thought to play a major role in the development of atopic disease. Adverse reactions to food are associated with different physical response mechanisms. Allergy is just one of these mechanisms. There is no consensus as to whether food allergies can be prevented.

We recommend the three useful strategies of prevention of allergic episodes in food allergy prone children

1. Education of allergy patients
2. Comprehensive labeling of food allergens in any commercial preparations and buffet menu and
3. Constant vigilant attitude about eating habits.

Commercial hypoallergenic dietary preparations and especially hydrolyzed protein and elemental or semi elemental diets are cost prohibitive and are rarely needed. Home made non-offending diets like amylase rich cereal foods, rice, soya, malt dextrin based diets are available. There is no adequate data available in our country to favor the use of robotics in food allergy. Several authorities recommend delaying introduction of major food allergens to infants from atopic families. Drugs have a minor role in delayed hypersensitivity food allergic reactions but drugs are lifesaving in acute anaphylactic drug reactions. The final message is that food allergy appears to be only a feature and must not be recognized as a separate disease entity. Hence stress must be on awareness of such an entity in our practice.

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