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Suresh Kishanrao *

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Review Article

Food Intolerance- Managing Metabolic Disturbance

Suresh Kishanrao

Family Physician & Public Health Consultant, Bengaluru.

*Corresponding Author: Suresh Kishanrao, Family Physician & Public Health Consultant, Bengaluru.

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Abstract

Food Sensitivity or Intolerance is defined as a non-immunological response initiated by a food or its component at a dose normally tolerated. Food intolerances primarily impact the digestive system, though they can also manifest in skin or respiratory issues such as rashes.

FODMAPs (Fermentable oligo-, di-, and monosaccharides & polyols), a group of poorly absorbed short-chain carbohydrates, like lactose, fructose more than glucose, fructans, galacto-oligosaccharides, and polyols and gluten have been incriminated in the West. However, in India and other developing countries wheat, milk, spices, are blamed for food intolerance, however, it is not possible to draw national conclusions on intolerances to food due to Vegetarianism, livestock consumption, preservation processes and cooking practices.

Symptoms of food intolerance vary greatly from one patient to the next, depending on the type of sensitivity and the severity. The most common symptoms include Gastrointestinal discomfort, Bloating, Stomach pain, Excess gas, Diarrhea, Vomiting, Nausea, Acid reflux/ heartburn, Headaches, Skin flushing, Irritability or anxiety and Fatigue. Symptoms tend to be proportionate to the amount of the food consumed. They may appear suddenly or over a matter of hours, in some cases lasting for 8-10 days afterwards.

Food intolerance is caused by a variety of factors like deficiencies in enzymes, sensitivities to certain food additives, environmental allergies, or naturally occurring chemicals in foods. They contribute to the body's inability to properly ingest or digest a certain food / ingredient.

Materials & Methods: Two anecdotal cases, one autobiography of Black Pepper Intolerance and other Gluten Intolerance the author managed form the essence of this article. It tries to distinguish clinically between Food Intolerance and Allergy and narrate simple symptomatic management of Food Intolerance and makes a passing mention of how to manage Food Allergies. Literature review of community and hospital studies of Food Intolerance and Allergy add value to the role of general physicians in attending such cases,

Key Words and

Keywords: elaeocarpus ganitrus roxb; rudraksha; ayurveda; bioactive compounds; pharmaceutical innovation

Abbreviations:

Food- Intolerance, Allergy, Poisoning, **FODMAPS**= Fermentable oligo-di-and monosaccharides & polyols. **Milk**/ Lactose Intolerance, Gluten Intolerance, Spices, **IBS**= irritable bowel syndrome, **IgG**= Immunoglobulin G, **IgE**= Immunoglobulin E, Anti-**tTG**= antibody to tissue transglutaminase, OIT= Oral immunotherapy, **NEFFY**= Epinephrine nasal spray, Omalizumab= anti-**IgE** monoclonal antibody.

Introduction

Acute ailments related to consumption of food are common in day-to-day life, as most often these day people rely on outsourced food. Conditions include food poisoning, food allergies, food intolerance or sensitivity and eating disorders in order of seriousness. If an individual or a family physician suspects a patient is having reactions to a specific food, determining whether it is food sensitivity or allergy is vital in ensuring safety, health, & quality of life [1].

FODMAPs (Fermentable oligo-, di-, and monosaccharides & polyols), a group of poorly absorbed short-chain carbohydrates, like lactose, fructose more than glucose, fructans, galacto-oligosaccharides, and polyols and gluten have been commonly incriminated in food intolerance in the West [2]. However, in India the predominant cereal grown and consumed is wheat in northern India and rice in southern and eastern India. The vegetables consumed vary with the region and season. Milk and dairy products are popular in states such as the Punjab, and fish is popular in the coastal states. Livestock consumption is largely influenced by religious beliefs. Nuts and fruits have regional distribution and, in general, are not easily affordable. The famous "Indian" spices and condiments are available everywhere in the subcontinent, but consumption varies with the region. There is wide variation in the way food is processed or prepared even in regions where the articles consumed are similar. Given this background, it is not possible to draw

conclusions on intolerances to food items, preparations /dishes that are universal [3].

The key challenge is how to know if the patient has food sensitivity, an intolerance, or a true food allergy? Symptoms can be similar, and it's important to know the difference between an allergy and an intolerance. highlight the differences from food allergies.

Acute ailments related to consumption of food include food poisoning, food allergies, and eating disorders. Physical reactions to certain foods are common, but most are caused by food intolerance rather than a food allergy. Both intolerance and intolerance cause some of the same signs and symptoms, so people often confuse the two.

While food intolerance often affects only the digestive system and causes less serious symptoms. A true food allergy affects the immune system, therefore even small amounts of the offending food can trigger a range of symptoms, which can be severe or life-threatening.

On the other hand, food poisoning is due to infections, meaning eating contaminated or stale food [1]. Food poisoning symptoms include fever, headache, nausea, vomiting, abdominal pain, and diarrhea. Common causes of food poisoning in India include Salmonella - found in eggs, poultry, and other animal products, Campylobacter found in raw milk, raw or undercooked poultry, and drinking water, enterohaemorrhagic Escherichia coli (E Coli) found in raw vegetables, partially cooked food or food handlers with poor hand hygiene practices.

In this article, the author tries to outline the key traits of food sensitivity/food intolerance. A recent episode of Black Pepper Intolerance – an autobiography of the author and another case of Gluten Intolerance in a male adult managed by this author a decade ago are the basis of this analysis and write-up. Both case reports highlight symptomatology, clinical diagnosis & rationale management of Food Intolerance avoiding unnecessary antibiotic use.

Case Reports:

Black Pepper Intolerance an autobiography:

In a dinner on Fifth December 2024, I ate 4 slices of Half Fry Brinjal (eggplant) spiced with Black pepper in Delhi. All was well when I went to bed around 1030pm. When I got up in the morning around 0630, I had my tummy upset and bloated, due to excess gas, and feeling Fatigued. Around 0800hrs I had Diarrhea-small quantity without my knowledge. Linking the episode to Pepper Intolerance, I tried to eat some bread and egg Omelet but could hardly eat a quarter of the Omelet. My mouth was bitter and there was absolutely no hunger. As I was to take a return flight around 15 hrs. rounded up the remaining tasks reached the airport around 1400 hrs. Surprisingly there was neither thirst, hunger, nor hypoglycemic attack despite being a known diabetic for over 33 yrs. Both in the airport and on the flight back for nearly 6 hrs. I was listless and drove home for another 1.5 hrs. Had taken a glass of water until 1930. After reaching home I just dosed off without even changing dress. Next morning noticed another bout of effortless diarrhea. Next 2days the situation was similar with 2-3 small diarrheal episodes a day, extreme fatigue and bitter mouth, I was just rehydrating myself with water, Tender coconuts, Butter milk and Coffee. It was only on Sunday I could eat a bit of Papaya fruit and Upama. Though diarrhea stopped by Sunday, the calf muscle weakness continued, I could hardly walk for half a Kilometer on 8th December Monday Morning. My appetite returned to normal only a week later, Wednesday the 10$^{th\ of}$ December, by then I was able to walk about 1.5 Kms. And do my routine Yoga for half an hour. While it took 8 full days to recover, the condition was mild, and I managed it by hydration, abstinence of food for 3 days and no drugs. As I report on 15th December, weakness continues (20%), my routine Yoga and Gym is yet to start, though have been walking half the distance that I used to do earlier, which may take another 2-3 days to recover.

Sachin with wheat Intolerance:

In 2013 I was on a visit to Pune from Delhi. On my visit to one of my nephew Sachin complained of tummy upset over a year and had exhausted all consultations starting from a family doctor, a physician and even Gastroenterologist. Key symptoms included stomach pain, bloating, and weakness- a typical presentation in adults without diarrhea or overt malabsorption. All possible blood tests, including allergy panel had not given a clue. A detailed history and by the process of exclusion, I could link his problem with consumption of wheat Roti's. Further inquiry got an affirmative response of his symptoms exaggerating on the days of consumption of wheat as either Roti or even Upama (made of broken wheat) or Seera (a sweeter version of broken wheat). I observed a significant stress on his daily routine and overall well-being. He was scared to eat his favorite wheat foods without side effects. He was nervous about eating in restaurants doubting what could hurt him. Though the symptoms ranged from mild to moderate I asked his entire family to stop consuming wheat in any form and surprisingly noticed his symptoms disappear in a week's time. After a month I asked him to resume eating just one roti at a time for about 2/3 days a week and then slowly built up to consume up to 3 roti's at time with no intolerance over a year. He has been perfectly alright since then and consumes wheat items in moderation.

Discussions:

The terms food sensitivity and food intolerance are Synonyms and used interchangeably. An estimated 20% percent of the global population suffers from some form of food intolerance. *It has been defined as a non-immunological response initiated by a food or its component at a dose normally tolerated. Food intolerances primarily impact the digestive system*, though they can also manifest in skin or respiratory issues such as rashes or a stuffy nose.

FODMAPs (Fermentable oligo-, di-, and monosaccharides & polyols), a group of poorly absorbed short-chain carbohydrates, like lactose, fructose, less often glucose, fructans, galacto-oligosaccharides, polyols and gluten have been commonly incriminated in food intolerance in the West. In India its prevalence varies, reported more in North India than in South India mainly in the population where whet is the staple diet.

Symptoms of food intolerance vary greatly from one patient to the next, depending on the type of sensitivity and the severity. The most common symptoms include Gastrointestinal discomfort, Bloating, Stomach pain, Excess gas, Diarrhea, Vomiting, Nausea, Acid reflux/ heartburn, Headaches, Skin flushing, Irritability or anxiety and Fatigue. Symptoms tend to be proportionate to the amount of the food consumed. They may appear suddenly or over a matter of hours, in some cases lasting for days afterwards.

Food intolerance is caused by i) deficiencies in enzymes, ii) sensitivities to certain food additives, iii) environmental allergies, or iv) even naturally occurring chemicals in foods. All contribute to the body's inability to properly digest a certain food or ingredient.

One of the most common forms of food sensitivity is lactose intolerance. Those who are lactose intolerant are unable to produce the enzyme lactase, which breaks down lactose. Lactose intolerance symptoms primarily involve the digestive system, resulting in gas, nausea, and abdominal pain. Those who are gluten intolerant (non-celiac gluten sensitivity) are unable to properly digest wheat, barley, or rye as was observed in our Sachin's case. Symptoms of gluten intolerance range from bloating and constipation to joint pain and anemia. Depression and anxiety have even been linked to gluten intolerance.

Irritable Bowel Syndrome (IBS) can be another common example of food intolerance, although the role of food sensitivity and intolerance in IBS is not yet fully understood. Studies have shown that IBS flare-ups often worsen after consuming certain foods and beverages, such as wheat, dairy products, milk, and carbonated drinks. Interestingly, emerging evidence shows that IBS symptoms may be triggered by an underlying intolerance.

A clinician needs to distinguish between Intolerance and allergy. Food intolerance often affects only the digestive system and causes less serious symptoms like Diarrhea, bloating, farting and tummy pain. A person with food intolerance may be able to eat small amounts of the offending food without trouble and be able to prevent a reaction. For example, a person with

Black Pepper intolerance can eat small quantity of black pepper spiced (sprinkled or dressed) food. Similarly, a child with lactose intolerance can drink lactose-free milk or be given lactase enzyme pills to aid digestion.

Causes of food intolerance include i) Absence of an enzyme needed to fully digest a food. Lactose intolerance or Gluten intolerance are common examples in Indians ii) irritable bowel syndrome, a chronic condition causes cramping, constipation and diarrhea iii) Sensitivity to food additives-Sulfites used to preserve dried fruit, canned goods and wine can trigger asthma attacks in people who are sensitive to food additives.

The key signs of food intolerance are i) Diarrhea ii) bloating iii) farting and tummy pain.

Sl. No	Variables	Intolerance	Allergy
1.	Systems Affected	Only the digestive system	Multiple systems
2.	Nature of Symptoms	Mild to Moderate	Moderate to Severe
3.	Onset	Delayed 2-10 hrs.	Immediate within 1 hr.
4.	Dose	Symptoms dose related	Small quantity triggers allergy
5.	Consuming offending food & reversing the sensitivity	Can eat small amounts of the offending food & can be reintroduced to it slowly	Can't eat even a small quantity
6.	Mechanism	It is a non-immunological response, involve IgG antibodies	A true food allergy affects the immune system, involves IgE antibodies
7.	Key signs & Symptoms	i) Diarrhea ii) bloating iii) farting and tummy pain.	A range of moderate to severe or life-threatening symptoms- rashes, constriction of airways, shock, rapid pulse, dizziness.
8.	Severity	Will not cause Anaphylaxis	Can cause Anaphylaxis
9.	Management	Focus on the individual's intolerances, a diet low in FODMAPs and gluten. Antibiotics have no role	Advice on elimination of food items allergic to in diets. Antibiotics have no role

On the other hand, a true food allergy affects the immune system, therefore even small amounts of the offending food can trigger a range of symptoms, which can be severe or life-threatening. In this case allergic individuals can't eat even a bit of the offending food. Food allergies symptoms include rashes, constriction of airways, shock, rapid pulse, dizziness, or lightheadedness.

The science of food intolerance is different from the science of food allergy. As allergies involve IgE antibodies one needs to test for them in Blood and food intolerances involve IgG antibodies, so look for elevation of the same. Food sensitivity /intolerance will not cause anaphylaxis, no matter how much of the offending food is consumed. Whereas a food allergy triggers an immune system reaction, releasing antibodies (IgE) causing the body to react to a threat, therefore, even small amounts trigger serious or life-threatening reactions.

Food sensitivity or food intolerance causes significant stress on your day-to-day life and overall well-being. One may not be able to eat one's favorite foods without side effects or may feel nervous about eating in restaurants. While most food sensitivity or food intolerance symptoms in adults range from mild to moderate, food allergy symptoms can be severe — and in some cases, life-threatening.

A family physician needs to assess if the symptoms are due to a food allergy or intolerance? Following tests can help:

A skin-prick test -where a drop of liquid containing a food your patient may be allergic to is put on his skin to see if it reacts-

Blood tests: Serum antibody test and antigen tests

Withdrawal Test: Suggest the patient avoids the food S/he/you suspect to be allergic one at a time and see if symptoms get better.

A study in Mumbai looked at 400 healthy subjects (276 men -69%; median age 40 years, and the 204 IBS patients (119 men median age of patients 36 years). 179 of the 400 (44.8%) healthy subjects and 147 of 204 (72.1%) IBS patients reported the prevalence of intolerance from 2.5 to 32%. Among a total of 204 reported 23 reported Wheat Sensitivity and 181 non-wheat sensitivity. Among the non-wheat sensitivity Milk (69), Pulses (59) & GLVs (53) sensitivity were the top 3. The other items were Cauliflower (29), Capsicum (27) Garlic (23), Fruits and Dry Fruits. While The list of items incriminated by the IBS group reported intolerance to all items (except milk and nuts) more frequently than the healthy subjects. Milk intolerance was reported equally commonly by the healthy subjects and patients with IBS. Twenty-three (11.3%) patients with IBS, and none of the healthy subjects, reported wheat sensitivity. Between the symptom subgroups of IBS patients, the diarrhea subgroup self-reported intolerance to milk, pulses, capsicum, cauliflower, leafy vegetables, and dry fruits more frequently than the constipation subgroup [3].

Gluten Intolerance in India:

The prevalence of gluten intolerance in India varies by region, with celiac disease being more common in the north than in the south or northeast basically because of the practice of consumption of wheat. Celiac disease is more prevalent in northern India, where wheat is the main staple cereal. A study in Ludhiana estimated that the prevalence of celiac disease was at least 1 in 310 people (3%). It is uncommon in southern India, and Northeastern India where rice is the main staple cereal.

Gluten intolerance is caused by an immune reaction to gluten, a protein found in wheat, rye, and other grains. This reaction damages the lining of the small intestine, preventing it from absorbing nutrients. Symptoms include stomach pain, bloating, and weakness.

The time of first exposure to wheat influences the development of celiac disease. Celiac disease affecting adults is now well recognized in northern India and other whet staple diet communities across India. In many of these adult individuals the presentation is atypical, i.e., without diarrhea or overt malabsorption.

The diagnosis of celiac disease is based on the presence of serologic tests (ELISA) confirming the presence of antibody to tissue transglutaminase (anti-tTG). The IgA anti-tTG provides the best specificity and is widely used. However, about 6% of healthy individuals are partially IgA deficient14 and in these individuals the diagnosis may be missed if only the IgA antibody test is done. Currently available diagnostic kits often provide both IgA and IgG antibody levels, enhancing the ability to make the diagnosis.

Spices and Black Pepper Intolerance in India:

Spices play a crucial role in Indian cuisine, not only adding complex taste, flavors and aromas to dishes but also serving as a traditional method of food preservation due to their antimicrobial properties and have perceived medicinal benefits. Key spices like cumin, turmeric, coriander, red chili, and black pepper are fundamental to most Indian dishes. Regional or even state

specific unique spice blends, are seen in India in creating diverse culinary experiences. Some examples are i) Cumin: A staple spice used in most curries, providing an earthy flavor ii) Turmeric popular for its vibrant yellow color and potential health benefits, often used in curries and dals iii) Coriander: adds a fresh, citrusy flavor, used both as whole seeds and ground powder iv) Red chili pepper provides heat and spice depending on the variety v) Black pepper, used for its pungent flavor and to enhance other spices vi) Cardamom, a fragrant spice is used in sweet dishes and garam masala and vii) Cloves adds a warm, spicy flavor and aroma.

Spicy foods contain a chemical called capsaicin, which activates a receptor found in our mouth and on our tongue called the TRPV1 receptor. There is some variation in the sensitivity of these receptors, and even the amount of them, from person to person.

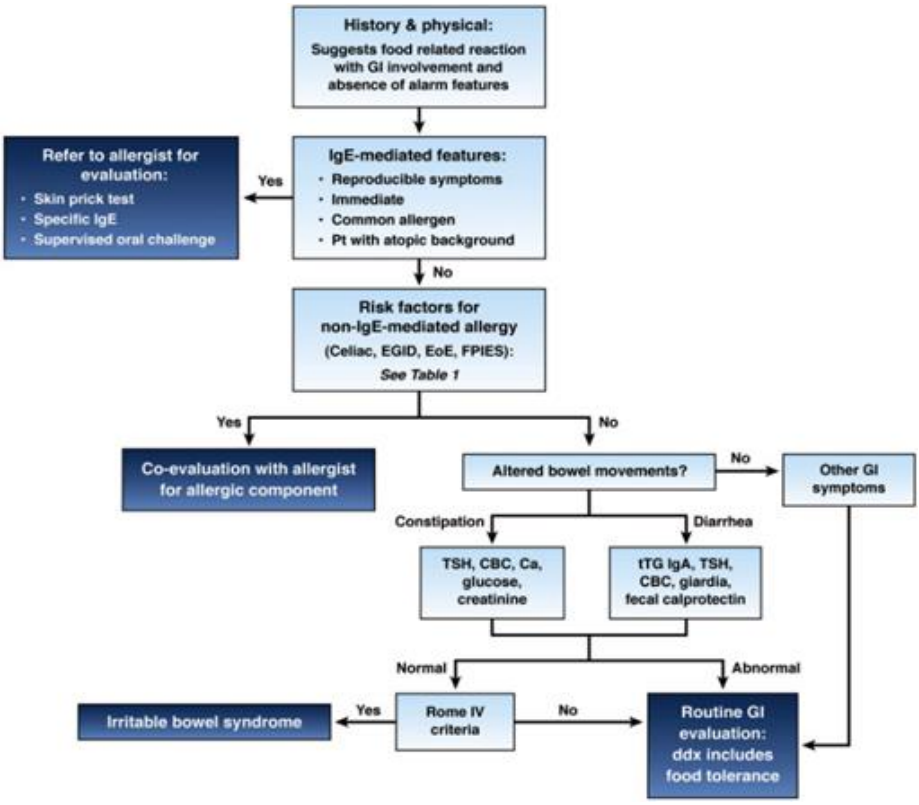
An intolerance to spices in Indian food, manifests as digestive discomfort like stomach upset, bloating, heartburn, diarrhea, or nausea after consuming dishes with high spice levels, particularly due to the capsaicin content in chili peppers, a common ingredient in many Indian curries; this can be caused by a variety of factors including individual physiological differences, pre-existing digestive conditions, or even simply a lower tolerance to spice levels, and may not always be a full-blown allergy to specific spices.

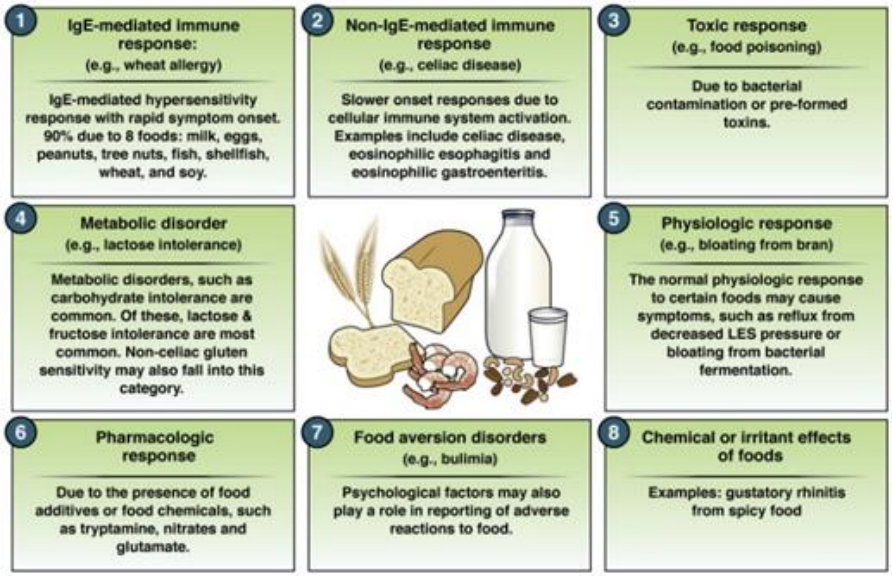
Black pepper is almost as common as salt in food preparation and extra adding among Indians. According to the Aging and Disease study, the piperine found in black pepper improves our cognitive health and vitality by reducing our risk of neurodegenerative disease. "Black pepper has brain-boosting benefits & has anti-inflammatory effects on human body. Sprinkling or Seasoning half fried or fried items like Pakoras, Brinjal, meat balls, chicken pieces etc. with salt is a common practice and adds to taste. This practice is common in restaurants and north Indian homes. Black pepper (Piper nigrum) Intolerance is possible but rare due to a protein called Piperine triggering reactions. Current suspicion is that it's a relationship between the GI and neurological systems (gut-brain axis). Capsaicin, a chemical component of chili peppers is an irritant & neurotoxin for humans and triggers the “pain” receptors. Some The American journal of Medicine has reported of studies recently that have inferred that pepper supplements cause liver injury in some people.

Diagnostic Algorithm & Management: A detailed history of food partaken in last 12-72 hours is the minimum inquiry a family physician must do. By sheer elimination one can arrive at possible. Most often the patient can identify. For example, our Black Pepper case knew he was intolerant and must consume in limited quantity but sheer effort of trying a bit more harmed him. Similarly, the Gluten intolerant case and his family could associate the symptoms with eating Wheat Roti’s or Upama. Most often the diagnosis of Intolerance is clinical. Give the slower onset in both our reported cases the author noted signs of loose motions, bloating or gas formation, mild discomfort, fatigue, unusual muscular weakness and diarrhea. Psychological symptoms as were reported in Sachin’s case are due to fear. Irritant effects include gustatory rhinitis or oral sensory disturbances.

Food related key disorders and their Mechanism [6]

Diagnostic algorithm of care management for patients with adverse reaction to food [6]





Management of Food Intolerance & Allergy:

Food Intolerance: Principles of managing food intolerance, include i) Manage the case symptomatically key being maintaining hydration, small frequent eating, anti-emetics if there is vomiting and binding agents for diarrhea. ii) try to avoid or reduce eating the food or any of the ingredients.

For food allergies: i) immediate management include IV fluids, adrenalin if patient is under shock antihistamines ii) Epinephrine nasal spray (neffy), Peanut allergy is a common cause of pediatric anaphylaxis. Epinephrine is the only life-saving treatment for anaphylaxis. Neffy's approved in August 2024, provides the first non-injectable epinephrine product, iv) Omalizumab (Xolair) is an anti-IgE monoclonal antibody injection for treatment of moderate-to-severe persistent asthma v) Peanut (Arachis hypogaea) allergen powder (Palforzia) is the only oral immunotherapy (OIT) for peanut allergy in children and teens ages 4 to 17.

Use of Percutaneous immunotherapy (PIT) a method for desensitizing the immune system to food allergies by applying small doses of an allergen to immune cells in the skin is the long-term solution.

Conclusion:

Food Intolerance has been defined as a non-immunological response initiated by a food or its component at a dose normally tolerated.

Food intolerances primarily impact the digestive system, though they can also manifest in skin or respiratory issues such as rashes or a stuffy nose or irritant Rhinitis or Stomatitis

An estimated 20% percent of the global population suffers from food intolerance; however, its incidence is not well documented in India and other developing countries

The prevalence of gluten intolerance and Spices Intolerance among adults, Lactose Intolerance among children in India vary by region, based on of the staple food patterns.

Food intolerance is caused by i) deficiencies in enzymes, ii) sensitivities to certain food additives, iii) environmental allergies, or iv) even naturally occurring chemicals in foods. All contribute to the body's inability to properly digest a certain food or ingredient.

Clinicians manage food intolerance, by i) symptomatic treatment like maintaining hydration, ii) abstinence from food for 12-24 hrs. followed by small frequent eating, iii) anti-emetics if there is vomiting and binding agents for diarrhea, iv)) Avoid the known food for some time or reduce eating the food or any of the ingredients and slowly rebuild the tolerance.

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