

Food Allergies and Intolerances: Challenges, Advances and Future Directions in Nutrition and Public Health

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DESCRIPTION

Food allergies and intolerances are increasingly recognized as significant public health concerns worldwide. Although they are often confused, the two conditions differ in their underlying mechanisms and impacts on health. Food allergies involve an immune system reaction, where the body mistakenly identifies certain food proteins as harmful. This response can trigger mild to severe symptoms, ranging from skin rashes to life-threatening anaphylaxis. In contrast, food intolerances do not involve the immune system; they occur when the digestive system cannot properly process certain components of food, such as lactose or gluten. While intolerances tend to cause discomfort rather than life-threatening conditions, they can still significantly affect quality of life.

The prevalence of food allergies has increased in recent decades, particularly among children. Common allergens include peanuts, tree nuts, milk, eggs, soy, wheat, fish and shellfish. Even trace amounts of these foods can trigger reactions in sensitive individuals. Symptoms may include hives, swelling, abdominal pain, vomiting, wheezing, or, in severe cases, anaphylaxis. Anaphylaxis requires immediate medical attention and the administration of epinephrine to prevent fatal outcomes. The rising incidence of food allergies has spurred research into possible causes, such as environmental changes, dietary patterns, reduced microbial exposure in early life and genetic predisposition.

In contrast, food intolerances are linked to difficulties in digesting or metabolizing certain food components. Lactose intolerance, caused by a deficiency in the enzyme lactase, is among the most common. Individuals with this condition experience bloating, diarrhea and abdominal pain after consuming dairy products. Gluten intolerance, which is distinct from celiac disease, refers to non-celiac sensitivity to gluten that causes discomfort without autoimmune damage. Other examples include sensitivity to food additives like sulfites or Monosodium Glutamate (MSG), which can trigger headaches, skin flushing, or digestive upset.

The diagnostic process for food allergies often involves medical history, skin prick tests, blood tests for Immunoglobulin E (IgE) antibodies and supervised food challenges. These assessments help distinguish true allergies from other conditions that may mimic symptoms. Diagnosis of food intolerances is usually more challenging, as symptoms may overlap with gastrointestinal disorders like irritable bowel syndrome. Elimination diets and careful monitoring are commonly used to identify intolerant foods.

Managing food allergies requires strict avoidance of allergens, which can be difficult due to the widespread presence of allergenic ingredients in processed foods. Reading labels, asking about ingredients in restaurants and educating caregivers and peers are essential steps in prevention. For severe allergy sufferers, carrying an epinephrine auto-injector is vital. Advances in food labeling laws in many countries have improved transparency, requiring manufacturers to highlight major allergens. However, cross-contamination during production remains a challenge, necessitating vigilance.

For food intolerances, management typically involves dietary adjustments rather than complete elimination. Lactose-intolerant individuals may tolerate small amounts of dairy or use lactose-free alternatives. Enzyme supplements can also aid digestion. Similarly, people with gluten intolerance or celiac disease often adopt gluten-free diets, which require careful planning to avoid nutrient deficiencies. The growing availability of alternative products, such as plant-based dairy substitutes and gluten-free grains, has expanded options for those managing intolerances.

Research into treatments for food allergies is ongoing. Immunotherapy, including Oral Immunotherapy (OIT), aims to gradually desensitize patients by introducing small, increasing amounts of allergens under medical supervision. While not a cure, this approach may reduce the severity of reactions and improve tolerance. Experimental therapies, such as epicutaneous immunotherapy (*via* skin patches) and sublingual immunotherapy (under the tongue), are also being studied. Advances in biotechnology hold promise for hypoallergenic foods that reduce risks while maintaining nutritional value.

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Psychological and social aspects of living with food allergies or intolerances cannot be overlooked. Children with severe allergies may feel excluded during school meals, parties, or social events. Adults may face anxiety about dining out or traveling. Support groups, education and awareness campaigns play an important role in reducing stigma and increasing understanding among the general public.

Global differences in prevalence and management approaches reflect cultural, dietary and policy factors. In Western countries, peanut and tree nut allergies are more common, whereas in parts of Asia, shellfish allergies dominate. Differences in early childhood feeding practices may partly explain these patterns. For instance, early introduction of peanuts in infant diets, as recommended by recent guidelines, appears to reduce the risk of developing peanut allergies later in life.

Food intolerances also vary geographically. Lactose intolerance is far more prevalent in East Asia, Africa and South America, where lactase persistence into adulthood is less common compared to populations of European descent. These differences highlight the role of genetics and cultural dietary history in shaping how populations respond to foods.

Technology is transforming the way allergies and intolerances are managed. Portable diagnostic devices, mobile applications

for allergen tracking and digital platforms for food labeling are empowering consumers to make safer choices. Biotechnology-driven food innovation may also contribute by developing modified foods with reduced allergenicity or by offering fortified alternatives for individuals avoiding entire food groups.

CONCLUSION

Food allergies and intolerances represent distinct but overlapping challenges in nutrition and public health. Allergies involve immune reactions that can be life-threatening, while intolerances are rooted in digestive difficulties that cause discomfort but rarely endanger life. Both conditions require accurate diagnosis, effective management and ongoing research to improve outcomes.

Progress in medical treatments, food technology and public awareness offers hope for improved quality of life for those affected. Education, transparent labeling and accessible alternatives are key to creating inclusive food environments. With continued advances in science and greater societal understanding, individuals with allergies and intolerances can maintain balanced, safe and nutritious diets without compromising their health or social participation.