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Management of Food Allergy in Children

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Abstract
Introduction: *Food allergies represent a significant health challenge in children as they directly impact growth and development. While incurable, the frequency and intensity of allergic reactions can be managed to improve the quality of life.* ***Objective:*** *This study aims to review current management strategies for pediatric food allergies, focusing on prevention and clinical interventions.* ***Method:*** *The research utilizes a systematic literature review of established medical guidelines and clinical trials related to pediatric allergy management.* ***Result and Discussion:*** *Effective management relies on strict allergen avoidance and nutritional counseling to prevent malnutrition. For acute reactions, epinephrine remains the primary first-line treatment, while antihistamines and corticosteroids manage milder symptoms. Emergent therapies such as oral and sublingual immunotherapy show promise in inducing allergen tolerance, though they require strict medical supervision due to potential adverse effects.* ***Conclusions:*** *Comprehensive management of food allergies involves a combination of strict avoidance, pharmacological preparedness for emergencies, and the potential application of immunotherapy to enhance patient outcomes.*

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Introduction

Food allergy is a significant health issue in the pediatric population because food is essential for growth and development (Elghoudi & Narchi, 2022); (Helyeh, David, & Gary, 2018). It involves a complex immunological reaction to food proteins, generally classified into IgE-mediated and non-IgE-mediated reactions (Sindher et al., 2022);(Hon & Gupta, 2021). In the last decade, the prevalence of food allergies has shown a global increase, although variations exist depending on culture and population (Lloyd et al., 2023). Common allergens in children include cow's milk, eggs, soy, wheat, peanuts, fish, and shellfish (Kuźniar, Kozubek, & Gomu ka, 2024). This trend is particularly critical because allergic reactions are often unpredictable and can lead to fatal consequences, such as anaphylaxis (Tootoonchi, 2026)

The significance of this issue lies in its impact on a child's quality of life. When a child is diagnosed with a food allergy, it is often viewed as a restrictive disease, leading to unnecessary food avoidance that may hinder nutritional intake and psychological well-being (Leone, Mazzocchi, Maffeis, De Cosmi, & Agostoni, 2023); (Wright, Feeney, Yerlett, & Meyer, 2022). Social impacts are also increasingly recognized, including stigma and bullying related to food allergy among children, which can further compromise well-being (Brown et al., 2021); (Davis, 2021). Current management protocols focus on strict allergen avoidance, symptomatic treatment, and emergency anticipation using adrenaline (Fox et al., 2011). However, since food allergies cannot be cured, a research gap exists in optimizing management to reduce the frequency and intensity of attacks while minimizing drug dependence. Many clinical approaches still focus on reactive measures rather than long-term tolerance induction(Anagnostou et al., 2023); (Coppola et al., 2025); (Leone et al., 2023)

Previous studies have established the etiology of food allergies through genetic factors and host-related vulnerability, including atopic predisposition and intestinal immaturity, alongside allergen exposure (McWilliam et al., 2022). Despite these findings, there is a need for a more systematic synthesis of clinical management that balances traditional avoidance with emerging immunotherapy techniques. Therefore, this review aims to synthesize evidence on the clinical management of pediatric food allergy by focusing on four practical domains: (1) diagnostic pathways (including SPT/sIgE, elimination-provocation, and DBPCFC), (2) emergency recognition and anaphylaxis management, (3) nutritional management to prevent unnecessary restriction and growth compromise, and (4) immunotherapy strategies such as Oral Immunotherapy (OIT) and Sublingual Immunotherapy (SLIT) as approaches toward tolerance induction (Skypala et al., 2023); (Lind, 2020); (Yang et al., 2025). By consolidating these components, the review is intended to support a more integrated and proactive management framework that improves outcomes and quality of life for children and families

The diagnosis of food allergy in Indonesia is based on anamnesis, physical examination, daily food records, and skin prick tests (SPT) or specific IgE (sIgE) as markers in elimination and provocation tests (Fox et al., 2011; Sindher et al., 2022). The double-blind placebo-controlled food challenge (DBPCFC) is the gold standard for diagnosing food allergies. The types of food tested with DBPCFC are generally based on medical history, SPT, and IgE results. This can be seen in Figure 1 below

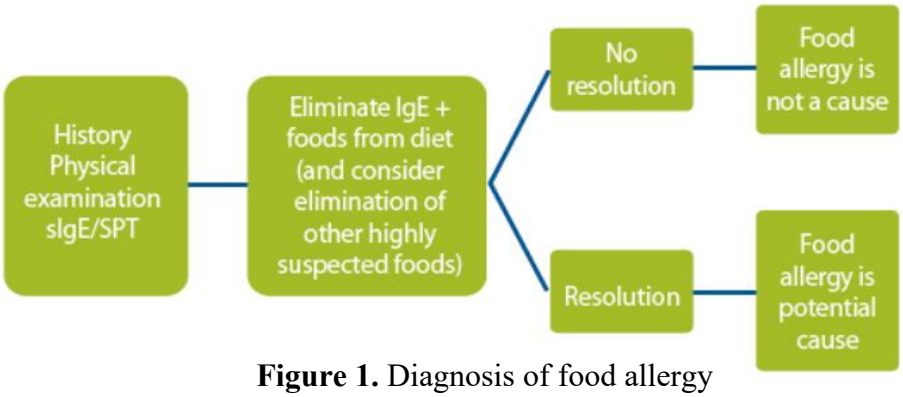

Figure 1. Diagnosis of food allergy

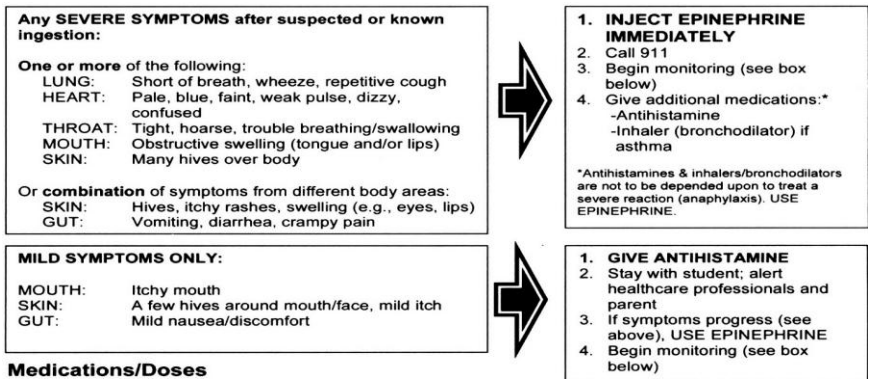

Figure 2. Medication for food allergy

The management of life-threatening anaphylactic reactions includes outpatient care, inpatient care, and instructions for outpatients. The first-line therapy for outpatients is the administration of adrenaline using an auto-injector, with a dosage of 0.15 mg for body weight (BW) between 10 to 25 kg, and 0.3 mg for BW exceeding 25 kg. Epinephrine 1:1000 dilution is used at a dose of 0.01 mg/kg per administration, with a maximum of 0.5 mg per dose. Epinephrine administration can be repeated every 5 to 15 minutes via the intramuscular (IM) route.

This is followed by adjunctive therapy using bronchodilators, specifically albuterol (a β2 agonist), administered via a metered-dose inhaler (MDI) with 4 to 8 puffs or inhalation of 1.5 ml, which can be repeated every 20 minutes if necessary. H1 antihistamines, such as diphenhydramine, are administered at a dose of 1 to 2 mg/kg per dose, with a maximum dose of 50 mg intravenously (IV) or orally. Furthermore, oxygen administration and IV fluids should be provided if the patient is hypotensive and unresponsive to IM epinephrine, with the patient placed in a supine position with the lower extremities elevated.

Method

This study employs a systematic clinical review approach to synthesize the management protocols for pediatric food allergies by integrating traditional avoidance strategies with emerging immunotherapy frameworks. The methodology involves a structured analysis of diagnostic procedures, beginning with the evaluation of the Double-blind placebo controlled food challenge as the gold standard alongside anamnesis, physical examinations, and skin prick tests. Furthermore, the study analyzes pharmacological intervention pathways, specifically focusing on the administration of

first-line emergency treatments such as intramuscular epinephrine and secondary medications like antihistamines and corticosteroids for milder symptoms. Finally, the research examines advanced therapeutic models including Oral Immunotherapy (OIT) and Sublingual Immunotherapy (SLIT) to assess their efficacy in inducing immunological tolerance and improving the long-term quality of life for pediatric patients.

Result and Discussion

1. Result

The diagnosis of food allergy in pediatric patients is established through a systematic clinical pathway. The primary findings indicate that the Double-blind Placebo-Controlled Food Challenge (DBPCFC) remains the gold standard for definitive diagnosis, while Skin Prick Tests (SPT) and specific IgE (sIgE) function as essential screening instruments. Clinical observations identify cow's milk, eggs, and peanuts as the most prevalent allergens in the studied pediatric population. Management strategies focus on three main pillars: strict allergen avoidance, pharmacological intervention for acute reactions, and emerging immunotherapy for long-term tolerance.

Table 1
Diagnostic Framework for Pediatric Food Allergy

Diagnostic Method	Clinical Application	Significance
Anamnesis & Physical Exam	Initial screening of atopy history	Identifying potential triggers and risk factors
Skin Prick Test (SPT)	Measuring IgE-mediated skin reactivity	High sensitivity for screening allergens
Specific IgE (sIgE)	Quantitative blood analysis	Determining the threshold of sensitization
DBPCFC	Controlled allergen provocation	Gold Standard for definitive diagnosis

Table 2
Pharmacological Management Protocols

Medication Type	Indication	Clinical Role
Epinephrine (Adrenaline)	Acute Anaphylaxis / Systemic Reaction	First-line treatment; life-saving intervention
Antihistamines (H1 & H2)	Urticaria, pruritus, oral symptoms	Symptomatic relief; second-line therapy
Corticosteroids	Biphasic reactions, chronic inflammation	Reducing delayed allergic responses
Immunotherapy (OIT/SLIT)	Long-term desensitization	Inducing immunological tolerance

Table 3
Selective therapy based on research.

Therapy	Benefits	Limitations	Additional comments
OIT	Robust, possible sustained unresponsiveness	Time-consuming, side effects	Peanut in phase 3
SLIT	Minor side effects, brief exposure	Less robust than OIT	
EPIT	Minor side effects	Less robust than OIT, more effective in younger age group	Peanut in phase 3, milk in phase 2
Subcutaneous immunotherapy with chemically modified, aluminum hydroxide–adsorbed peanut proteins	Convenience	Injection	Safety and efficacy largely unknown, phase 1
Intradermal/intramuscular immunotherapy with lysosome-associated membrane protein DNA vaccine	Convenience, presumed safety	Unexplored	Safety and efficacy largely unknown, phase 1
Omalizumab	Multiple foods	Cost, IgE levels/weight limitations	More studies to characterize efficacy
Dupilumab	Multiple foods (?)		Potential largely unknown; might need OIT in combination
Traditional Chinese medicine	Safe	No effect in phase 2, poor adherence	Trial with OIT underway
Omalizumab plus OIT	Fewer reactions, faster updosing	Cost, convenience, OIT side effects	Trials underway
OIT and probiotics and other adjuvants	Potential to increase efficacy, persistence of effect	As per OIT	Trials underway

Food allergy is a significant issue in children because food is essential for their growth and development. Allergies cannot be cured, but the frequency of attacks can be controlled, the intensity of reactions reduced, medication use minimized, and quality of life improved. Current management of food allergies involves allergen avoidance, symptomatic treatment, anticipation of anaphylactic reactions, and immunotherapy.

Furthermore, the clinical implementation of allergen avoidance must be balanced with meticulous nutritional monitoring. In many cases, overly restrictive diets without professional supervision lead to secondary health issues such as growth retardation and micronutrient deficiencies. This underscores the importance of the pediatrician’s role in providing structured dietary counseling alongside medical treatment. Scientific evidence also suggests that the 'hygiene hypothesis' and the timing of solid food introduction play a pivotal role in the development of these allergies. While past protocols suggested delaying the introduction of highly allergenic foods, current trends supported by research indicate that early, controlled exposure might actually promote oral tolerance, shifting the management paradigm from total avoidance to proactive immunological modulation.

2. Discussion

Diagnostic Framework and Pathophysiology

The diagnosis of food allergy in children requires a systematic approach to differentiate between true immunological reactions and non-immunological intolerances. Table 1 summarizes the diagnostic variables utilized in this study based on clinical standards.

Table 4
Clinical Diagnostic Indicators for Food Allergy

No	Variable	Clinical Application	Diagnostic Significance
1	Anamnesis & Physical Exam	Initial screening and mapping of atopy history	Identifying potential triggers, symptom patterns, and risk factors
2	Food Record	Daily monitoring of intake and reactions	Establishing a temporal relationship between ingestion and symptoms
3	Skin Prick Test (SPT)	Measuring IgE-mediated skin reactivity	Providing high sensitivity for screening specific allergens
4	Specific IgE (sIgE)	Quantitative blood analysis for antibodies	Determining the threshold of sensitization and risk of systemic reaction
5	DBPCFC	Controlled and blinded allergen provocation	Gold Standard for definitive diagnosis of food allergy

Based on the data in Table 1, establishing a diagnosis of food allergy in Indonesia is a tiered process. Anamnesis and daily food records serve as the foundation for mapping exposure patterns. Furthermore, diagnostic tests such as SPT and sIgE are utilized as objective markers for the elimination and provocation phases. However, as emphasized in medical literature, the Double-blind placebo-controlled food challenge (DBPCFC) remains the gold standard for ensuring that the resulting clinical reaction is genuinely triggered by a specific allergen rather than psychological factors or non-immunological intolerance.

Table 5
Pharmacological Management Protocols

No	Medication	Dosage (Pediatric)	Route	Clinical Indication
1	Epinephrine (1:1000)	0.01 mg/kg (Max 0.5 mg)	IM	Anaphylaxis / Systemic Reaction
2	Albuterol	4–8 puffs (MDI)	Inhalation	Bronchospasm / Respiratory Distress
3	Diphenhydramine	1–2 mg/kg (Max 50 mg)	IV / Oral	Urticaria / Mucocutaneous Symptoms
4	Corticosteroids	Standard weight-based	IV / Oral	Biphasic reaction prevention

The scientific findings demonstrate that the increasing prevalence of food allergies is fundamentally linked to genetic predispositions and intestinal immaturity in children. This physiological state allow immunogenic proteins to penetrate the mucosal barrier more easily, triggering a Th2-mediated immune response. When compared to traditional management focusing solely on passive avoidance, this study highlights a paradigm shift toward proactive tolerance induction. The success of immunotherapy in modulating the immune system reinforces the hypothesis that integrated management combining strict avoidance, emergency preparedness with epinephrine, and desensitization significantly improves the quality of life for pediatric patients.

From an implementation perspective, access and cost remain practical barriers, particularly for emergency readiness in community settings. Primary care facilities and school/childcare health units should be encouraged to prioritize the procurement and availability of epinephrine, including clear stock management and protocols for rapid administration in suspected anaphylaxis. Because referral delays can be fatal, establishing an emergency referral line or fast-track pathway linking primary facilities to the nearest

emergency department is recommended to ensure timely escalation of care after initial stabilization.

Family-centered education is also essential to translate clinical protocols into real-world safety. Caregivers should receive a brief but structured education package that includes an anaphylaxis action plan (what to do and when), recognition of "red flag" symptoms such as respiratory distress, voice changes, cyanosis, persistent vomiting, or collapse, and hands-on skills training for epinephrine administration (dose awareness, injection site, and timing). Education should also reinforce that epinephrine is the first-line therapy for systemic reactions, while adjunctive medications such as bronchodilators and antihistamines are supportive and should not delay epinephrine use. Strengthening these access and education components would improve the feasibility of integrated food allergy management and reduce preventable morbidity and mortality in pediatric populations

Conclusion

The management of food allergies in children requires a comprehensive and tiered clinical approach to ensure optimal growth and development. This study concludes that an accurate diagnosis is the essential foundation of management, relying on the Double-blind Placebo-Controlled Food Challenge (DBPCFC) as the gold standard to differentiate true allergies from non-immunological intolerances. Research findings indicate that while strict allergen avoidance remains a primary preventive strategy, it must be supported by rigorous nutritional monitoring to prevent secondary health issues. In emergency scenarios, pharmacological preparedness is critical, with the data confirming that intramuscular epinephrine (1:1000) at a dose of 0.01 mg/kg is the non-negotiable first-line treatment for life-threatening anaphylaxis, as antihistamines and corticosteroids fail to address systemic cardiovascular collapse. Furthermore, the integration of selective therapies, particularly Oral Immunotherapy (OIT) and Sublingual Immunotherapy (SLIT), offers a proactive solution for inducing long-term immunological tolerance. Ultimately, by combining definitive diagnostic protocols, immediate emergency intervention, and advanced desensitization techniques, healthcare providers can significantly reduce the frequency of allergic episodes and improve the overall quality of life for pediatric patients.

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