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Trends in Allergic Diseases and Parental Knowledge on Food Labeling: Eczema, Food Allergy, and Rhinitis

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Abstract **Review Article**

Allergic diseases cannot conclusively be controlled due to highly complex mechanisms. Eczema, food allergy, and rhinitis have attracted much parental attention and concern. Cumulative reports indicate more current cases than the previous generation. The present study inquired into parental knowledge regarding food labeling among households with children suffering eczema, food allergy, and rhinitis. With knowledge on food labeling not received comparable attention, and inadequate studies addressing this occupation within diverse allergic diseases, the research is anticipated to further relevant policies in allergy management. Eczema, food allergy, and rhinitis are chronic, IgE-mediated allergic diseases. Among children aged 8 to 12, the prevalence of eczema, food allergy, and rhinitis was 30.3%, 13.4%, and 28.8%, respectively, with the first presenting the highest prevalence. The incidence of eczema was significantly increased, particularly among children aged 2–4 in South Korea. Diagnostic criteria and severity scales have been widely adopted to uniformly share disease status. Eczema is regarded as the first stepping-stone and plays an important role in the allergy march. The hygiene hypothesis postulates that excessive hygiene and a decrease in early exposure to microbes have triggered the rapid rise in atopic diseases. Food allergy frequently occurs at the initial stage of atopic disorders and is strictly removed during sick leave, contributing significantly to the qu2cef1ba2-d5e2-4821-98bd-553cf703da2bty of life. Avoiding specific allergens is essential to prevent anaphylaxis, a potentially life-threatening condition. Rhinitis has a profound impact on daily life, with 75%–80% of individuals affected by allergic and non-allergic types. The understanding of allergen labeling, including the regulatory definition of allergens and common ambiguities, is limited. For example, foods that “may contain” allergens are usually concerned by manufacturers due to the uncertainty of occurrence, while such information is generally regarded as precautionary labeling. Practices regarding food selection and the interpretation of labels lack exploration. Parents reportedly read food labels with multiple strategies and actively communicate with manufacturers. Barriers influence the accurate understanding of allergen labeling. Knowledge of the regulatory definition and ambiguities about food allergen labeling, as well as the strategy of selecting food and the consideration of cross-contamination, have yet to reached sufficient scholarly attention.

Keywords: Parental knowledge, Food allergen labeling, Precautionary allergen labeling, Pediatric allergic diseases, Eczema, food allergy, and rhinitis.

1. INTRODUCTION

Widespread changes in lifestyle, environment, food, and economy have contributed to an increase in allergy prevalence and various allergic diseases in developing countries [1]. Young children commonly exhibit allergic diseases such as eczema, food allergy, and rhinitis; the concern among parents, especially those bearing these [2]. Food safety in children is of utmost importance, as the increasing prevalence of food allergy in young children evokes parental concern [3]. Parents are increasingly concerned about food labeling to prevent allergy development [4]. The present study assessed trends in allergic diseases, food allergy, and over-the-counter food labeling among parents of young children [5]. A panel survey of parents with children aged 0 to 6 years was conducted. Data on the prevalence and trends of eczema, food allergy, and rhinitis have been reported on a cohort survey, and trends in parental knowledge and awareness regarding food labeling of allergy-related information have been reported on a continuous basis [6]. Parents seeking preventive measures for allergic diseases in children are aware of food labeling; still, knowledge on labeling practices remains low [7]. Parental knowledge of allergy-related food labeling practices should be supplemented with educational support and materials through readily available communication channels [8].

Results of a survey conducted on the knowledge and practice of parents regarding allergy-related labeling of food products indicated that parents of children aged 0 to 6 years have incorrect knowledge regarding the meaning of allergen labeling [9]. Trend data on food-related allergies among children aged 0 to 6 years show that the trend regarding the prevalence of atopic dermatitis is gradually decreasing; still, it remains significantly higher than that of food allergies [10]. Awareness of food-allergy labeling has increased, but misinformation prevails, signifying that further education is necessary to guide and safeguard children from food allergies [11]. Further examination of allergic diseases among young children and the progress regarding the labeling of food allergies is warranted in parallel with parental knowledge on the matter [12].

3. Allergic Disease Trends

Atopic dermatitis [eczema], food allergy, and allergic rhinitis are increasing in number [13]. These trends are worrying for HDM- and HMWF-rai-dominant countries like India [14]. Understanding the rising trends in allergic diseases is essential for optimal clinical decision-making and policy formulation [15]. The decision to consult a medical practitioner, presentation of symptoms, and recognition of disease status depend on parental understanding of these disorders and differential patterns in knowledge must be characterized [13].

Atopic dermatitis is defined as a chronic inflammatory skin disease due to an abnormal immune response and the skin barrier's impairment [16]. Disease onset typically occurs during infancy/early childhood A substantial proportion of young children with atopic dermatitis will develop other forms of allergic disease, particularly food allergy, with an associated atopic march leading to asthma and allergic rhinoconjunctivitis [17]. Atopic dermatitis has significant direct/indirect morbidity, including diminished quality of life, increased healthcare resources, and parental suffering [18]. It represents the most common chronic skin disease of childhood [19].

The allergy-related disease with the highest prevalence is food allergy, with foods comprising wheat, egg, milk, peanut, and fish being the most responsive [20]. The cornerstone of diagnosis relies on clinical history regarding the manifestation of symptoms following the ingestion of a specific allergenic food [21]. The severity of food allergy is often classified to facilitate the management of dietary elimination and the assessment of risk–benefit pertaining to the introduction of food [22]. The most serious manifestation of food allergy can ultimately lead to anaphylactic responses requiring immediate intervention [23]. Avoiding problematic food[s] is the primary mode of dietary management in childhood [24].

Allergic rhinitis is a common disorder caused by an altered immune response to environmental allergens, with symptoms including nose itching, conjunctivitis, and excessive nasal discharge [7]. The disease often follows a seasonal pattern [25]. The common allergen categories are tree pollens, weed pollens, grass pollens, fungal spores, pets, and dust mites [26]. Allergic rhinitis is commonly viewed as a separate clinical entity; however, it may relate to the same continuum of allergy-related disease characteristic of atopy and be co-existent with other allergy-related disorders, such as atopic dermatitis [27].

3.1. Eczema

Atopic dermatitis, commonly referred to as eczema, is a chronic condition characterized by dry, itchy, inflamed skin [28]. It has a complex pathophysiology that involves interactions among genetic, immunological, and environmental factors and the epidermal barrier [22]. The condition causes considerable discomfort and distress, particularly in infants, children, and young adults, and is one of the most common chronic inflammatory skin diseases [29]. Eczema affects approximately 200 million people worldwide, according to the World Health Organization [30]. It is primarily associated with food allergy and allergic rhinitis and is therefore of great relevance to the present investigation [31].

Eczema can vary in severity and duration and can occur in consecutive episodes [32]. The earliest onset is often during the first year of life, with an epidemic peak between 3 months and 3 years [33]. Thereafter, prevalence declines, and atopic dermatitis may persist or reappear at a later age [34]. The debilitating consequences of eczema on both children and caregivers are well documented, with reports indicating greater impacts on quality of life than asthma or other conditions [35]. Moreover, eczema is associated with increased utilization of healthcare services and higher economic costs [36]. Research indicates that approximately one-third of children with atopic dermatitis develop eczema other atopic conditions by 6 months of age, and more than 90% of affected patients go on to acquire an additional allergic condition, such as food allergy or allergic rhinitis [37]. The condition is characterized by pruritic [itchy] exudative lesions in infancy [38]. During older infancy and early childhood, atopic dermatitis manifests as dry, lichenified, scaly lesions with varying characteristics [39]. In the teenage cohort, the disease tends to remit in adulthood but persists for extended periods, remaining active beyond adolescence in many cases [40]. Eczema is typically associated with the elevation of immunoglobulin E [IgE] and sensitization to indoor allergens, as well as a range of food allergen sensitivities [39]. Nevertheless, diagnosis can be challenging due to disparities in definition, skin-colored clinical manifestations, and interpatient variability [40].

3.2. Food Allergy

Food allergies are rising globally, leading to acute reactions and anaphylaxis, the latter necessitating

prompt intervention [41]. Diagnosis involves assessing symptoms, trigger foods, family history, skin testing, and blood tests for immunoglobulin E antibodies [42]. Safety relies on thorough food and product ingredient checks, yet 45–86% of severe reactions stemmed from mistakenly consumed allergens [41].

Children may develop allergic reactions to various foods, notably peanuts, tree nuts, sesame, milk, eggs, fish, soy, and wheat, common allergens [42]. Severity varies, with anaphylaxis a major concern requiring stringent dietary control to avert exposure. Distinct clinical history filters out non-allergic food reactions [43].

3.3. Rhinitis

Rhinitis encompasses a spectrum of phenomena caused by inflammation of the nasal mucosa, resulting in an array of associated symptoms. Rhinitis can be classified as allergic [AR] or non-allergic [NAR] [7]. The clinical symptoms of rhinitis include sneezing, nasal itching, rhinorrhea, nasal obstruction, postnasal drip, and conjunctivitis [27]. Allergic rhinitis is one of the most prevalent allergic diseases worldwide, leading to impairment in the quality of life and productivity due to its chronic nature [22]. Colloquially still referred to as “hay fever”, allergic rhinitis is a heterogeneous disorder characterized by paroxysms of sneezing, nasal congestion, itching, and rhinorrhea due to exposure to allergen[s] such as pollen, dust mites, animal dander, and mold [44]. Common airborne allergens in each locality of India cause allergic rhinitis in the general population [45].

Adult and adolescent chronic allergic rhinitis is often associated with other allergic diseases like asthma and eczema [9]. Symptoms of allergic rhinitis often occur seasonally [46]. Perennial AR is commonly associated with house dust mite where the manglicolous species of D. pteronyssinus is considered a significant indoor allergen in various confederations of India [47]. Other facilities of perennial allergic rhinitis within Indian subcontinental setup are agent of various pollens, animal epithelium, and house dust from infested residences [1]. The selection of appropriate skin prick test panel of various allergens is significant for diagnosis of the disease [48].

Rhinitis encompasses an array of nasal respiratory disorders characterized by symptoms involving the nasal mucosa [49]. Rhinitis can be classified as either “allergic” or “non-allergic” [50]. Allergic rhinitis, in particular, is a common allergic disease that negatively impacts quality of life [51]. Rhinitis is prevalent in India, where the majority of affected individuals possess allergic rhinitis [52].

4. Parental Knowledge and Food Labeling

Epidemiological trends of allergic diseases indicate the highest prevalence and incidence of hypersensitivity among infants and toddlers [53]. Furthermore, due to media exposure, parental knowledge regarding allergenic food labeling among food manufacturers has increased [4]. Therefore, understanding the knowledge level of allergen labeling as well as the food selection strategies employed when reading food labels is crucial [54]. The World Health Organization has defined allergies as hypersensitive reactions and an aberrant reaction by the immune system from a normally innocuous substance or allergen. An allergic reaction may result in eczema, food allergy, and rhinitis [55]. Understanding the regulatory requirements of labeling the allergenic substances in packaged food products and the difficulties encountered during food selection and reading the labels are thus vital for the standard development to optimize the allergen labeling, allowing consumers to make an informed decision on purchasing food spanning across diverse food categories [53].

Food allergy indicates a hypersensitive reaction observed primarily among infants and toddlers [4]. The commonly identified allergens leading to food allergy by food safety authorities include milk, eggs, peanuts, seafood, wheat, soy, tree nuts and sesame, exhibiting a relationship pattern with eczema [56]. The common food selection strategies adopted by allergic and non-allergic parents as well as the awareness of allergen labeling across the diverse products are soft and preventive but not allergic escalation option [5]. Parental regulations governing allergen labeling utilizing precautionary labeling and precautionary advisory with clear information on the allergic nature, risk of cross-contamination during production methods is thus crucial [57]. The labeling option of containing a particular allergen presents an indicator or sign of containing a specific allergen without validation to the co-presence of other allergens [58]. These parameters help convey to the food manufacturers and establishments involved in food production the awareness and concentration level of food allergen labeling being educated and practiced by parents [42]. Recent studies have shed light on the impact and effect of allergens on the vital overall health of children with respect to specific illnesses, life threatening situations and food restrictions, emphasizing further exploration and understanding of allergen labeling [60].

4.1. Understanding of Allergen Labeling

The EU has established a comprehensive framework for food allergen regulations to help consumers with food allergies make effective risk assessments [61]. Regulation No 1169/2011 defines the 14 most common food allergens that must be indicated on food labels and sets rules for their presentation in the ingredients list [62]. Common examples include peanut, nuts, wheat, gluten, fish, and milk, and these must be emphasized in the ingredients list or through precautionary labeling, such as indicating the presence of allergens within or may contain [63]. Allergen labeling in South Korea is also regulated; the 22nd Food

Sanitation Act defines 21 major food allergens, such as egg, milk, and soy, requiring that they are stated clearly on food labels [64]. However, a number of ambiguities and uncertainties exist about allergen labeling practices, the nature of precautionary statements, and the necessary steps to mitigate allergen cross-contamination [61].

A variety of terms are used in food labeling to signify possible allergen exposure and cross-contamination, including "may contain," "can contain," "may contain traces of," and "potentially contains." [65]. Some manufacturers provide lists of allergens that may be present, so-called "allergen lists," but differences in presentation and formatting often complicate the identification of pertinent information [66]. Similar ambiguity affects precautionary labeling on products regulated by the Ministry of Food and Drug Safety, which may include the expression "cross-contamination," the indication of specific ingredients or manufacturing processes, and vague terms such as "possibility" [53]. In addition, a lack of consumer-oriented educational materials on allergen labeling complicates the understanding of food allergen exposure and cross-contamination issues [67].

4.2. Practices in Food Selection and Label Interpretation

Health Canada, CFIA and Health P Canada y together r y allergen labeling and la for-food products [68]. Briefly, food allergen c f citial and fishery t and c p l products, gluten, added sulphites, peanuts—required in ingredient lists [69]. May-contai ers p allergen d b y d e content [70]. Cereals containing gluten for gluten-free food. Peanut-free, nut-free, fish-free do not guarantee allergen absence; therefore, precautionary allergen statements advised [53]. Packaging regulations E113-31 specify contents in roman characters, writing or typesize legible everywhere of product at fact possible [68]. Art Tamil, Ormants and other local scripts, symbols, letters cannot be used.

Study evaluates food-selection practices food-allergic mothers provide packed lunches allergens cross-contamination-certification communication manufacturers [71].

4.3. Barriers to Accurate Labeling and Education

Food allergies among children have increased alarmingly over the past two decades [5]. Approximately 35% of young children with atopic dermatitis [AD] also have food allergy, particularly infants and toddlers with moderate to severe disease [72]. Population prevalence estimates for food allergy among children vary widely, from 0.1% to 10% [73]. Commonly cited triggers include egg, milk, peanut, fish, and tree nuts [74]. Despite regulatory guidelines on the appropriate diagnosis, epidemiology, and management of food allergy, considerable and widespread misinformation remains [75]. The general public continues to overestimate prevalence, as does a sizeable portion of the parental cohort of children with AD [76]. Many individuals report food allergies without a formal diagnosis and are prone to misdiagnose themselves or their children [77]. Among those reporting peanut allergy, the lifetime history of such diagnosis is only 50% [78]. Common misconceptions, including the view that oral allergy syndrome [OAS] represents true food allergy, reinforce the need for improved education on allergen avoidance and treatment, especially for the families of children with AD [41].

Rhinitis is another common atopic condition and one of the most frequently reported symptoms worldwide [45]. For allergic rhinitis, appropriate definitions need to be established and validated [79]. Moreover, diagnostic criteria need to be broadened and tightened [2]. Accumulating population-based cohort data reveal that rhinitis has increased in parallel with other atopic conditions [80]. A meta-analysis across different populations, spanning 1990 through 2006, revealed marked growth [81]. Seasonal and perennial rhinitis appear to be increasing, but the patterns may differ among geographical regions, communities, and ethnicities still require more in-depth studies [53].

5. DISCUSSION

Allergens rank among the top ten causes of severe, life-threatening reactions among children aged 0 to 4 years in Hong Kong [4]. Consultations on suspected food allergies constitute the largest single category of referrals to pediatric speci2cef1ba2-d5e2-4821-98bd-553cf703da2bsts and clinics, accounting for 30.3% of first appointments [82]. Eczema is often the first manifestation of food allergy within the first three years of life. Food allergy, eczema, and allergic rhinitis share many common environmental predisposition factors [82]. Furthermore, a consistent association exists whereby a preceding diagnosis of atopic eczema increases the risk of developing food allergy [69]. Eczema, food allergy, and rhinitis thus ranked as the top three allergic conditions for exploration in this study [83]. Accurate understanding of allergen allergen labeling [the technical definitions of "allergen" and "labeling", existing requirements and their inadequacy, prevalent different uses and how this affects prevention, and guidance/protection on "what's safe"] is crucial for enhanced job effectiveness [71].

A recent study revealed that allergen or ingredient labeling on a pre-packed food product is the only widespread strategy both nationwide and at the community level parents employ to avoid allergenic foods especially post-food allergy labeling [84]. Labelling on most pre-packed food products either substantively restricts or totally prohibits the use of certain allergens or allergenic ingredients [85]. Many parents emphasized the critical role of such labeling in safeguarding food safety and guiding ingredient level; gradation of parental understanding of

allergen/ingredient labeling remained low across four allergenic food types [86]. In the category of food containing milk, knowledge regarding allergen/ingredient labeling during the main or major avoidance stage surged upwards yet correspondingly diminutive level of knowledge persisted [87].

Hygiene Hypothesis indicates that delivery by caesarean section, postnatal exposure to antibiotics, non-breastfeeding, pet ownership, and hygiene practice relates negatively while older siblings, dietary intervention and griculture practice relates positively to avatar eczema [88]. Box 2. Proposed Models on the Theoretical Development of Allergic Diseases [89].

6. CONCLUSION

Recent systematic reviews have quantified trends in allergic conditions, cohort studies suggest that reported allergic disease may be increasing in new generations across diverse countries, and a meta-analysis indicates heightened eczema prevalence in certain high-income regions [79]. National registry data in the Netherlands also reveal that parental questionnaire responses suggest rising childhood eczema levels between 1993—1998 and 2000—2005 [90]. The absence of food allergy data hampers epidemiological comparisons with this allergen, while rhinitis trend data remain scarce and only recently became central to Dutch policy concerns [91]. Allergen labeling knowledge analyses thus provide an opportunity to contrast these specific developments with aspects of parental decision making across the three contexts [92]. Strategies for reading product labels, in particular, reflect hygiene-hypothesis forecasts of rising allergen avoidance as an essential societal counteraction [93].

REFERENCES

1. Antonogeorgos G, B. Panagiotakos D, N. Priftis K, Liakou E et al. Parental Education Moderates the Relation between Physical Activity, Dietary Patterns and Atopic Diseases in Adolescents. 2022. ncbi.nlm.nih.gov
2. Goniotakis I, Perikleous E, Fouzas S, Steiropoulos P, Paraskakis E. A clinical approach of allergic rhinitis in children. Children. 2023 Sep 19;10[9]:1571. mdpi.com
3. Venter C, Palumbo MP, Sauder KA, Glueck DH, Liu AH, Yang IV, Ben-Abdallah M, Fleischer DM, Dabelea D. Incidence and timing of offspring asthma, wheeze, allergic rhinitis, atopic dermatitis, and food allergy and association with maternal history of asthma and allergic rhinitis. World Allergy Organization Journal. 2021 Mar 1;14[3]:100526. sciencedirect.com
4. Tedner SG, Asarnoj A, Thulin H, Westman M, Konradsen JR, Nilsson C. Food allergy and hypersensitivity reactions in children and adults—A review. Journal of internal medicine. 2022 Mar;291[3]:283-302. wiley.com
5. Elghoudi A, Narchi H. Food allergy in children—the current status and the way forward. World journal of clinical pediatrics. 2022. nih.gov
6. Mehta Y, Fulmali DG. Relationship between atopic dermatitis and food allergy in children. Cureus. 2022. cureus.com
7. Bernstein JA, Bernstein JS, Makol R, Ward S. Allergic rhinitis: a review. Jama. 2024. researchgate.net
8. D'Auria E, Minutoli M, Colombo A, Sartorio MU, Zunica F, Zuccotti G, Lougaris V. Allergy and autoimmunity in children: non-mutually exclusive diseases. A narrative review. Frontiers in pediatrics. 2023 Nov 2; 11:1239365. frontiersin.org
9. Kostecka M, Kostecka-Jarecka J, Kostecka J, Iłowiecka K, Kolasa K, Gutowska G, Sawic M. Parental knowledge about allergies and problems with an Elimination Diet in Children aged 3 to 6 years. Children. 2022 Nov 4;9[11]:1693. mdpi.com
10. Doğan S, Severcan EU, Özer M, Ertuğrul A. Habits and perspectives on reading allergy food labels of parents of children with food allergies. Pediatric Allergy, Immunology, and Pulmonology. 2023 Sep 1;36[3]:104-9. sagepub.com
11. Kim SH, Lee SM. Knowledge and management of food allergy by parents of preschool children who experience food allergies. Journal of Nutrition and Health. 2023. e-jnh.org
12. Chafei H, El Harake MD, Toufeili I, Kharroubi SA. Knowledge, attitudes, and practices of consumers on food allergy and food allergen labeling: A case of Lebanon. Foods. 2023. mdpi.com
13. Barne M, Singh S, Krishan Mangal D, Singh M et al. Global Asthma Network Phase I, India: Results for allergic rhinitis and eczema in 127,309 children and adults. 2022. ncbi.nlm.nih.gov
14. Christensen MO, Barakji YA, Loft N, Khatib CM, Egeberg A, Thomsen SF, Silverberg JI, Flohr C, Maul JT, Schmid-Grendelmeier P, Halling AS. Prevalence of and association between atopic dermatitis and food sensitivity, food allergy and challenge-proven food allergy: a systematic review and meta-analysis. Journal of the European Academy of Dermatology and Venereology. 2023 May;37[5]:984-1003. wiley.com
15. Choi HG, Kim SY, Joo YH, Cho HJ, Kim SW, Jeon YJ. Incidence of asthma, atopic dermatitis, and allergic rhinitis in Korean adults before and during the COVID-19 pandemic using data from the Korea National Health and Nutrition Examination Survey. International Journal of Environmental Research and Public Health. 2022 Nov 1;19[21]:14274. mdpi.com
16. Kelly KA, Balogh EA, Kaplan SG, Feldman SR. Skin disease in children: effects on quality of life, stigmatization, bullying, and suicide risk in pediatric acne, atopic dermatitis, and psoriasis patients. Children. 2021. mdpi.com
17. Wollenberg A, Werfel T, Ring J, Ott H, Gieler U, Weidinger S. Atopic dermatitis in children and

adults: diagnosis and treatment. Deutsches Ärzteblatt International. 2023 Mar 31;120[13]:224. nih.gov
18. Cinicola BL, Corrente S, Castagnoli R, Lougaris V, Giardino G, Leonardi L, Volpi S, La Torre F, Federici S, Soresina A, Cancrini C. Primary atopic disorders and chronic skin disease. Pediatric Allergy and Immunology. 2022 Jan;33:65-8. wiley.com
19. Ramírez-Marín HA, Silverberg JI. Differences between pediatric and adult atopic dermatitis. Pediatric dermatology. 2022. wiley.com
20. Yoshisue H, Homma Y, Ito C, Ebisawa M. Prevalence of food allergy increased 1.7 times in the past 10 years among Japanese patients below 6 years of age. Pediatric Allergy and Immunology. 2024 Jul;35[7]:e14192. wiley.com
21. Turner PJ, Conrado AB, Kallis C, O'Rourke… E. Time trends in the epidemiology of food allergy in England: an observational analysis of Clinical Practice Research Datalink data. The Lancet Public …. 2024. thelancet.com
22. Feng H, Luo N, Lu Y, Lu J, Zhou J, Xiong X, Chen Z, Chen Y, Wu Y. Prevalence of parent-reported food allergy among children in China: A population-based cross-sectional survey. Frontiers in Immunology. 2022 Dec 12;13:982660. frontiersin.org
23. Vazquez JM, Kankam A, Jordon K. Health disparities in food allergy. Current Problems in Pediatric and Adolescent Health Care. 2025 Apr 16:101731. [HTML]
24. Arasi S, Morais-Almeida M, Martin BL, Wong GW, Ansotegui IJ, Ebisawa M, Custovic A, Santos A, Nowak-Wegrzyn A, Stoddart A, Deschildre A. Food allergy severity across the world: A World Allergy Organization international survey. The World Allergy Organization Journal. 2025 Nov 12;18[11]:101123. nih.gov
25. Sharma K, Akre S, Chakole S, Wanjari MB. Allergic rhinitis and treatment modalities: a review of literature. Cureus. 2022. cureus.com
26. Zhang Y, Lan F, Zhang L. Update on pathomechanisms and treatments in allergic rhinitis. Allergy. 2022. wiley.com
27. Zhang Y, Lan F, Zhang L. Advances and highlights in allergic rhinitis. Allergy. 2021. wiley.com
28. Hussain N, Bhatti AN, Khan BN, Siddiqa A, Azhar S, Zahra T. Survey on Eczema; Its Perceptions and Characterization: Perception and Characterization of Eczema. Pakistan BioMedical Journal. 2024 Aug 31:11-6. pakistanbmj.com
29. Wang SP, Stefanovic N, Orfali RL, Aoki V, Brown SJ, Dhar S, Eichenfield LF, Flohr C, Ha A, Mora C, Murase JE. Impact of climate change on atopic dermatitis: a review by the International Eczema Council. Allergy. 2024 Jun;79[6]:1455-69. wiley.com
30. Faye O, Flohr C, Kabashima K, Ma L, Paller AS, Rapelanoro FR, Steinhoff M, Su JC, Takaoka R, Wollenberg A, Yew YW. Atopic dermatitis: A global health perspective. Journal of the European Academy of Dermatology and Venereology. 2024 May;38[5]:801-11. wiley.com
31. Lee W, Chaudhary F, Agrawal DK. Environmental Influences on Atopic Eczema. Journal of environmental science and public health. 2024 Jun 13;8[2]:101. nih.gov
32. Tokura Y, Yunoki M, Kondo S, Otsuka M. What is "eczema"?. The Journal of Dermatology. 2025 Feb;52[2]:192-203. wiley.com
33. Sethi S. Eczema [dermatitis]. Concise Dermatology. 2021. [HTML]
34. Prohic A. Dermatitis and Eczema. Dermatovenerology Textbook. 2024. [HTML]
35. Zalewski A, Krajewski PK, Szepietowski JC. Prevalence and characteristics of itch and pain in patients suffering from chronic hand eczema. Journal of Clinical Medicine. 2023. mdpi.com
36. Bilal H, Showkat M, Tabassum N. Eczema, Etiology and Treatment. InNatural Products for Treatment of Skin and Soft Tissue Disorders 2023 Oct 26 [pp. 1-49]. Bentham Science Publishers. [HTML]
37. Kushnir-Grinbaum D, Bokhari L, Frewen J, Moussa A, Triwongwaranat D, Ghiya R, Dias FR, Yong SS, Bhoyrul B, Dabbagh Z, Kazmi A. Systemic Treatment of Moderate to Severe Alopecia Areata in Adults: Updated Australian Expert Consensus Statement. Australasian Journal of Dermatology. 2025 Nov 1. wiley.com
38. Sugiyama A, Murakami Y, Okamoto K, Nakano H, Wakatsuki M, Kawano T, Akamine Y, Iwata M, Motomura C, Kojima K, Oda M. Nocturnal scratching and quality of sleep in children with atopic dermatitis. Acta dermato-venereologica. 2023 Oct 23;103:12345. nih.gov
39. Choo ZY, Mehlis SL, Joyce JC. Updates in atopic dermatitis for the primary care physician: A review of advances in the understanding and treatment of atopic dermatitis. Disease-a-Month. 2024. [HTML]
40. Dhar S, De A, Rajgopalan M, Godse K, Patil A, Chakraborty D, Pandhi D, Zawar V, Podder I, Chatterjee M, Sarda A. Skin Allergy Research Society and Society for Eczema Studies Joint Task Force Guidelines of Care for Management of Atopic Dermatitis for Adults, Children, and Special Populations in India: An Evidence-Based Review and an Expert Consensus. Indian Journal of Dermatology. 2025:10-4103. lww.com
41. S Gupta R, S Kim J, A Barnathan J, B Amsden L et al. Food allergy knowledge, attitudes and beliefs: Focus groups of parents, physicians and the general public. 2008. ncbi.nlm.nih.gov
42. Gargano D, Appanna R, Santonicola A, De Bartolomeis F, Stellato C, Cianferoni A, Casolaro V, Iovino P. Food allergy and intolerance: A narrative review on nutritional concerns. Nutrients. 2021 May 13;13[5]:1638. mdpi.com
43. Luparelli A, Losito I, De Angelis E, Pilolli R, Lambertini F, Monaci L. Tree nuts and peanuts as a source of beneficial compounds and a threat for

allergic consumers: Overview on methods for their detection in complex food products. Foods. 2022 Mar 1;11[5]:728. mdpi.com
44. Nur Husna SM, Tan HT, Md Shukri N, Mohd Ashari NS, Wong KK. Allergic rhinitis: a clinical and pathophysiological overview. Frontiers in medicine. 2022 Apr 7;9:874114. frontiersin.org
45. Savouré M, Bousquet J, Jaakkola JJ, Jaakkola MS, Jacquemin B, Nadif R. Worldwide prevalence of rhinitis in adults: a review of definitions and temporal evolution. Clinical and translational allergy. 2022 Mar;12[3]:e12130. wiley.com
46. Urrutia-Pereira M, Mocelin LP, Ellwood P, Garcia-Marcos L, Simon L, Rinelli P, Chong-Neto HJ, Solé D. Prevalence of rhinitis and associated factors in adolescents and adults: a Global Asthma Network study. Revista Paulista de Pediatria. 2023 Mar 3;41:e2021400. scielo.br
47. Rosario CS, Murrieta-Aguttes M, Rosario NA. Allergic rhinitis: impact on quality of life of adolescents. Eur Ann Allergy Clin Immunol. 2021 Nov;53[6]:247-51. eurannallergyimm.com
48. Schuler IV CF, Montejo JM. Allergic rhinitis in children and adolescents. Immunology and Allergy Clinics. 2021 Nov 1;41[4]:613-25. stonybrookmedicine.edu
49. Moitra S, Mahesh PA, Moitra S. Allergic rhinitis in India. Clinical & Experimental Allergy. 2023. [HTML]
50. Mahesh PA, Moitra S, Mabalirajan U, Garg M, Malamardi S, Vedanthan PK, Christopher DJ, Agrawal A, Krishna MT. Allergic diseases in India–Prevalence, risk factors and current challenges. Clinical & Experimental Allergy. 2023 Mar;53[3]:276-94. [HTML]
51. Sundararaman V, Ponni AS. EPIDEMIOLOGY OF ALLERGIC RHINITIS IN INDIA: A SYSTEMATIC REVIEW. Int J Acad Med Pharm. 2023. academicmed.org
52. Barne M, Singh S, Mangal DK, Singh M, Awasthi S, Mahesh PA, Kabra SK, Mohammed S, Sukumaran TU, Ghoshal AG, Sinha S. Global Asthma Network Phase I, India: Results for allergic rhinitis and eczema in 127,309 children and adults. Journal of Allergy and Clinical Immunology: Global. 2022 May 1;1[2]:51-60. sciencedirect.com
53. Park SE, Kwon YS, Paik JK, Kwak TK et al. Perception and practice regarding allergen labeling: focus on food-related employees. 2016. ncbi.nlm.nih.gov
54. Felix MMR, Kuschnir FC, Boechat JL, Castells M. Recent findings on drug hypersensitivity in children. Frontiers in Allergy. 2024. frontiersin.org
55. Wong TJ, Yu T. Association between socioeconomic status and prevalence of hypersensitivity diseases and Autism: a Nationwide study of children. Maternal and child health journal. 2023. [HTML]
56. H Fardan Z, Abdullah Aoun Alshahrani M, T Alalyani R, E Alshahrani A et al. Knowledge and Awareness About Food Allergy Among Mothers With Allergic Children in the Aseer Region, Saudi Arabia. 2023. ncbi.nlm.nih.gov
57. Halken S, Muraro A, de Silva D, Khaleva E, Angier E, Arasi S, Arshad H, Bahnson HT, Beyer K, Boyle R, du Toit G. EAACI guideline: preventing the development of food allergy in infants and young children [2020 update]. Pediatric Allergy and Immunology. 2021 Jul;32[5]:843-58. wiley.com
58. Wang LJ, Mu SC, Lin MI, Sung TC, Chiang BL, Lin CH. Clinical manifestations of pediatric food allergy: a contemporary review. Clinical Reviews in Allergy & Immunology. 2022 Feb;62[1]:180-99. [HTML]
59. 4 D, Appanna R, Santonicola A, De Bartolomeis F, Stellato C, Cianferoni A, Casolaro V, Iovino P. Food allergy and intolerance: A narrative review on nutritional concerns. Nutrients. 2021 May 13;13[5]:1638. mdpi.com
60. Jutel M, Agache I, Zemelka-Wiacek M, Akdis M, Chivato T, Del Giacco S, Gajdanowicz P, Gracia IE, Klimek L, Lauerma A, Ollert M. Nomenclature of allergic diseases and hypersensitivity reactions: Adapted to modern needs: An EAACI position paper. Allergy. 2023 Nov;78[11]:2851-74. wiley.com
61. Elrahi B, Mehanna Z, Haidar S, Serhan M et al. Food allergies and allergens in Lebanon: Characterization and perceptions toward labeling. 2023. ncbi.nlm.nih.gov
62. Smits NG, Ballin NZ, Bruggeman C, Fæste CK, Pastorelli AA, van Poucke C, Voorhuijzen-Harink MM, Westphal Y, Walker M, Winkel M, Koops AJ. The changing food allergen landscape in Europe calls for harmonised food allergen monitoring: Position paper. Food Control. 2025 Feb 1;168:110915. [HTML]
63. Son E. Food Labelling of Allergens: The Latest Regulations in Europe and Their Effects. European Food and Feed Law Review [EFFL]. 2024. [HTML]
64. Cubero-Leon E, Emons H, O'Connor G, Nørgaard J, Robouch P. Food allergen analysis: Considerations for establishing a reference measurement system to implement EU legislation. Food Chemistry. 2023 Oct 30;424:136391. sciencedirect.com
65. Fiocchi A, Risso D, DunnGalvin A, Díaz SN, Monaci L, Fierro V, Ansotegui IJ. Food labeling issues for severe food allergic patients. World Allergy Organization Journal. 2021 Oct 1;14[10]:100598. sciencedirect.com
66. Blom WM, van Dijk LM, Michelsen-Huisman A, Houben GF, Knulst AC, Linders YF, Verhoeckx KC, Holleman BC, Lentz LR. Allergen labelling: current practice and improvement from a communication perspective. Clinical & experimental allergy. 2021 Apr;51[4]:574-84. wiley.com
67. Chang F, Eng L, Chang C. Food allergy labeling laws: international guidelines for residents and travelers. Clinical Reviews in Allergy & Immunology. 2023. nih.gov

68. Anne Cochrane S, Hazel Gowland M, Sheffield D, Wilfrid Robert Crevel R. Characteristics and purchasing behaviours of food-allergic consumers and those who buy food for them in Great Britain. 2013. ncbi.nlm.nih.gov
69. Ali F, Ali H, Nollet LM. Food Products Regulations in Canada. InGlobal Regulations of Medicinal, Pharmaceutical, and Food Products 2024 Jul 5 [pp. 288-301]. CRC Press. [HTML]
70. Tam S, Chen D. Survey of Food Product Labels to Assess Compliance With Labelling Provisions in Canada. BCIT Environmental Public Health Journal. 2023. bcit.ca
71. Kim KK. Legal Implications of Digital Health Apps Informing Food Allergy Labeling for Consumers' Health and Privacy Protection. 2024. indiana.edu
72. Jaiswal YS, Williams LL. The Rising Incidence of Food Allergies and Infant Food Allergies. Annual Review of Food Science and Technology. 2025 Jan 1;16. annualreviews.org
73. Leung ASY, Xing Y, Wong GWK. Food allergies: challenges in the management of this global epidemic. Allergy Medicine. 2025. sciencedirect.com
74. Edwards-Salmon SE, Padmanabhan SL, Kuruvilla M, Levy JM. Increasing prevalence of allergic disease and its impact on current practice. Current Otorhinolaryngology Reports. 2022 Sep;10[3]:278-84. [HTML]
75. Di Cesare G, Carciofi A, Borgiani F, Cappelletti D, Correani A, Monachesi C, Gatti S, Lionetti ME. Are We Meeting the Needs? A Systematic Review of Nutritional Gaps and Growth Outcomes in Children with Multiple Food Allergies. Nutrients. 2025 May 5;17[9]:1590. nih.gov
76. Annesi-Maesano I, Fleddermann M, Hornef M, von Mutius E, Pabst O, Schaubeck M, Fiocchi A. Allergic diseases in infancy: I-epidemiology and current interpretation. World Allergy Organization Journal. 2021 Nov 1;14[11]:100591. sciencedirect.com
77. Nishanbayevich RM. THE PREVALENCE OF ALLERGIC DISEASES IN CHILDREN AND THE EFFECTIVENESS OF IMMUNOTHERAPY METHODS. Web of Medicine: Journal of Medicine, Practice and Nursing. 2025 May 29;3[5]:547-53. webofjournals.com
78. Kotchetkoff EC, Suano-Souza FI, Neri Gama de Almeida D, Barreto TL, Mendonça RB, Sarni RO. Ultra-processed food intake and food allergy in children and adolescents. International Journal of Food Sciences and Nutrition. 2024 Apr 2;75[3]:317-24. [HTML]
79. Liva GA, Karatzanis AD, Prokopakis EP. Review of rhinitis: classification, types, pathophysiology. Journal of clinical medicine. 2021. mdpi.com
80. Ripp AT, Patel PA, Nguyen SA, Schafer IV, Duffy AN, Soler ZM, Schlosser RJ. Variations in the Severity of Rhinitis Symptoms: A Systematic Review and Meta-Analysis. World Journal of Otorhinolaryngology-Head and Neck Surgery. 2025. wiley.com
81. Strachan DP, Rutter CE, Asher MI, Bissell K, Chiang CY, El Sony A, Ellwood E, Ellwood P, García-Marcos L, Marks GB, Morales E. Worldwide time trends in prevalence of symptoms of rhinoconjunctivitis in children: Global Asthma Network Phase I. Pediatric Allergy and Immunology. 2022 Jan;33[1]:e13656. wiley.com
82. Lee MT, Wu CC, Ou CY, Chang JC et al. A prospective birth cohort study of different risk factors for development of allergic diseases in offspring of non-atopic parents. 2017. ncbi.nlm.nih.gov
83. Dribin TE, Schnadower D, Spergel JM, Campbell RL, Shaker M, Neuman MI, Michelson KA, Capucilli PS, Camargo Jr CA, Brousseau DC, Rudders SA. Severity grading system for acute allergic reactions: a multidisciplinary Delphi study. Journal of Allergy and Clinical Immunology. 2021 Jul 1;148[1]:173-81. jacionline.org
84. Yee NS, Shao Q, Uraipong C, Shoji M et al. A comprehensive survey of allergen labeling on pre-packaged food products imported from Mainland China. Food control. 2021. [HTML]
85. Wang J, Liu W, Wu Y, Gao J, Chen H. Comprehensive landscape of allergen labelling on pre-packed snack foods available in China. Journal of Consumer Protection and Food Safety. 2024 Mar;19[1]:89-97. [HTML]
86. Steinman HA, van Zijl C. 14. Food allergies and food allergen control. Applied food science. 2022. brill.com
87. Biswas D, Chakraborty D, Manna A. Food Marketing and Labelling: A Practical Guide. 2025. [HTML]
88. Perkin MR, Strachan DP. The hygiene hypothesis for allergy–conception and evolution. Frontiers in allergy. 2022. frontiersin.org
89. Buttussi F, Chittaro L. Embedding Test Questions in Educational Mobile Virtual Reality: A Study on Hospital Hygiene Procedures. IEEE Transactions on Learning Technologies. 2024 Oct 29. ieee.org
90. W. de Jong N, J. Elbert N, M. Mensink-Bout S, P. M. van der Valk J et al. Parental and child factors associated with inhalant and food allergy in a population-based prospective cohort study: the Generation R Study. 2019. ncbi.nlm.nih.gov
91. Xing Y, Wong GWK. Environmental influences and allergic diseases in the Asia-Pacific Region: what will happen in next 30 years?. Allergy. . nih.gov
92. Ogulur I, Pat Y, Ardicli O, Barletta E, Cevhertas L, Fernandez-Santamaria R, Huang M, Bel Imam M, Koch J, Ma S, Maurer DJ. Advances and highlights in biomarkers of allergic diseases. Allergy. 2021 Dec;76[12]:3659-86. wiley.com
93. Jutel M, Mosnaim GS, Bernstein JA, Del Giacco S, Khan DA, Nadeau KC, Pali-Schöll I, Torres MJ, Zemelka-Wiacek M, Agache I. The One Health approach for allergic diseases and asthma. Allergy. 2023 Jul;78[7]:1777-93. researchgate.net