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Editorial

Understanding the Patterns and Clustering of Inhalant Allergic Sensitization

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The global prevalence of allergic diseases has significantly increased over the last two decades, posing a major public health concern worldwide [1,2]. Recent epidemiological studies on the associations of sensitization to common inhalant or food allergens with subsequent allergic diseases are of particular interest. Understanding the clustering patterns of multiple allergens could advance our knowledge of allergen sensitization clinically. When a patient is confirmed to be sensitized to certain allergens with allergic symptoms, the physician could advise the patient to avoid or be aware of other antigens based on proximity on a dendrogram. However, few studies have conducted cluster analyses of inhalant allergen sensitization.

Schmitz et al. [3] evaluated the prevalence of allergic sensitization and patterns of sensitization to common inhalant and food allergens in a nationwide representative sample of children and adolescents in Germany. They identified seven sensitization groups: Timothy grass/rye, house-dust mites, food/mugwort, birch/apple, animals, cow's milk/egg white, and molds. Salo et al. [4] investigated clustering, sociodemographic, and regional patterns of allergic sensitization and evaluated risk factors associated with immunoglobulin E (IgE)-mediated sensitization with data from the United States National Health and Nutrition Examination Survey (2005–2006). In that study, hierarchical cluster analysis identified seven clusters: plants (grass, tree, weed, and peanut), dust mites (*Dermatophagoides farina*, *Dermatophagoides pteronyssinus*), pets (dog/cat), cockroach/shrimp, molds (*Alternaria alternata*, *Aspergillus fumigatus*), foods (egg white/cow's milk), and rodents (mouse/rat). In another study, medical records of 4,360 patients with multiple allergen simultaneous test results at a dermatology clinic in South Korea were retrospectively reviewed and a cluster analysis was performed to elucidate the allergen-specific IgE cluster pattern [5]. In total, 39 items were grouped into eight clusters and each cluster had characteristic features.

In the current issue of *Clinical and Experimental Otorhinolaryngology*, Kim et al. [5] investigated patterns of sensitization to inhalant allergens through a computational analysis using a four-parameter unified Richards model to identify the clustering of inhalant allergic sensitization. In total, 7,504 individuals' skin prick data were collected and analyzed. Through the Ward method of hierarchical clustering, three clusters of inhalant allergic sensitization were identified: cluster 1 (*D. pteronyssinus* and *D. farinae*), cluster 2 (mugwort, cockroach, oak, birch, cat, and dog), and cluster 3 (*Alternaria tenus*, ragweed, *Candida albicans*, Kentucky grass, and meadow grass). Each allergen cluster had a different trajectory over the lifespan. Cluster 1 showed a high level (>50%) of sensitization at an early age (before 19 years), followed by a sharp decrease in sensitization. Cluster 2 showed a moderate level (10%–20%) of sensitization before 29 years of age, followed by a steady decrease in sensitization. Finally, cluster 3 had a low level (<10%) of sensitization at all ages. Although there were slight differences in the exact values, this tendency is similar to results of previous studies conducted in other countries [3,4]. Similar findings of age-related changes in sensitization have also been reported by several studies, and support the immunosenescence hypothesis [6,7]. As cluster 1 and cluster 2 contain the most prevalent inhalant allergens in South Korea [8], early control of allergic sensitization to cluster 1 and cluster 2 may be crucial in treating allergic diseases.

As allergic sensitization is a significant risk factor for atopic diseases, monitoring the prevalence and patterns of IgE-mediated sensitization in populations over time is important for the control and prevention of allergic diseases. The authors [5] found that inhalant allergens in the South Korea consisted of three hierarchical clusters and that these three clusters had distinct sensitization-desensitization patterns according to age. These findings could help us understand the characteristics and behavior of inhalant allergens, which may influence the diagnosis and treatment algorithms of allergic diseases.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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REFERENCES

1. Pearce N, Ait-Khaled N, Beasley R, Mallol J, Keil U, Mitchell E, et al. Worldwide trends in the prevalence of asthma symptoms: phase III of the International Study of Asthma and Allergies in Childhood (ISAAC). Thorax. 2007 Sep;62(9):758-66.
2. Asher MI, Montefort S, Bjorksten B, Lai CK, Strachan DP, Weiland SK, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC phases one and three repeat multicountry cross-sectional surveys. Lancet. 2006 Aug;368(9537):733-43.
3. Schmitz R, Ellert U, Kalcklosch M, Dahm S, Thamm M. Patterns of sensitization to inhalant and food allergens: findings from the German Health Interview and Examination Survey for Children and Adolescents. Int Arch Allergy Immunol. 2013;162(3):263-70.
4. Salo PM, Arbes SJ Jr, Jaramillo R, Calatroni A, Weir CH, Sever ML, et al. Prevalence of allergic sensitization in the United States: results from the National Health and Nutrition Examination Survey (NHANES) 2005-2006. J Allergy Clin Immunol. 2014 Aug;134(2):350-9.
5. Kim DK, Park YS, Cha KJ, Jang D, Ryu S, Kim KR, et al. Cluster analysis of inhalant allergens in south korea: a computational model of allergic sensitization. Clin Exp Otorhinolaryngol. 2021 Feb;14(1): 93-9.
6. Shen CY, Lin MC, Lin HK, Lin CH, Fu LS, Fu YC. The natural course of eczema from birth to age 7 years and the association with asthma and allergic rhinitis: a population-based birth cohort study. Allergy Asthma Proc. 2013 Jan-Feb;34(1):78-83.
7. Cazzoletti L, Ferrari M, Olivieri M, Verlato G, Antonicelli L, Bono R, et al. The gender, age and risk factor distribution differs in self-reported allergic and non-allergic rhinitis: a cross-sectional population-based study. Allergy Asthma Clin Immunol. 2015 Dec;11:36.
8. Park SC, Hwang CS, Chung HJ, Purev M, Al Sharhan SS, Cho HJ, et al. Geographic and demographic variations of inhalant allergen sensitization in Koreans and non-Koreans. Allergol Int. 2019 Jan;68(1): 68-76.

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