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RESEARCH ARTICLE

Phenotypic Characteristics and Co-sensitization Patterns in Pediatric *Cupressus Arizonica* Sensitization

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ABSTRACT

Objective: Sensitization to *Cupressus arizonica* has increasingly been reported in children and may contribute to allergic diseases. This study aimed to evaluate the demographic and clinical characteristics of pediatric patients with *C. arizonica* sensitization and compare monosensitized and polysensitized phenotypes.

Materials and Methods: This retrospective study included 163 children aged 4–18 years with *C. arizonica* sensitization identified by extract-based skin prick testing (SPT). Patients were divided into two groups, monosensitized and polysensitized, based on their SPT and/or specific IgE results.

Results: Among 1560 children undergoing SPT, 163 (10.4%) showed *C. arizonica* sensitization; 38 (23.3%) were monosensitized, and 125 (76.7%) were polysensitized. Ninety-eight (60.1%) patients were male. The median current age was 136 months (IQR, 100–180). Polysensitized patients had an earlier symptom onset (p=0.03), while age, sex, and symptom patterns were comparable between the groups. Allergic rhinitis was significantly more frequent in polysensitized children (84.8% vs. 52.6%, p=0.01), whereas the presence of asthma, atopic dermatitis, chronic urticaria/angioedema, disease severity, lung function parameters, and environmental factors did not differ significantly. Total IgE levels and eosinophil counts were significantly higher in the polysensitized group (p=0.01 for both). *C. arizonica* SPT wheal and erythema diameters were similar between the groups. Among polysensitized patients, co-sensitization was most common for timothy grass (75.2%), cultivated grasses (65.6%), and cat dander (54.4%).

Conclusion: *C. arizonica* sensitization is increasingly prevalent and frequently accompanied by co-sensitization. Although polysensitized patients showed earlier symptom onset and more frequent allergic rhinitis, the number of sensitizations was not directly associated with disease severity, highlighting the multifactorial nature of allergic diseases.

Keywords: Allergic rhinitis, asthma, atopic dermatitis, children, *Cupressus arizonica*, sensitization

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INTRODUCTION

Childhood allergic diseases are strongly influenced by local aeroallergen exposure.[1] Sensitization to tree pollens from the Cupressaceae family has been increasingly reported in pediatric populations, particularly in Mediterranean and temperate regions, owing to their prolonged pollination periods and expanding distribution.[2–4] In Türkiye, tree pollens constitute a substantial component of the pollen burden, with Cupressaceae pollens detectable across extended periods of the year.[5] Among these, *Cupressus arizonica* has emerged as a clinically relevant aeroallergen due to its environmental resilience and widespread use in urban landscaping.[2,3,6] Climate change–related alterations in pollen distribution and seasonality may further contribute to rising sensitization rates and the growing burden of associated allergic diseases.[1–3] Recent evidence suggests that up to 40% of individuals sensitized to Cupressaceae develop clinically relevant allergy, predominantly presenting as rhinitis or rhinoconjunctivitis, while allergic diseases such as asthma and atopic dermatitis also occur.[2,4,6,7]

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Previous studies on aeroallergen sensitization patterns have demonstrated that polysensitization is associated with more persistent symptoms, higher total IgE levels, and multiple comorbidities.[8–10] However, it remains unclear whether these associations reflect distinct clinical and laboratory phenotypes in mono- and polysensitized children with *C. arizonica*. Establishing this distinction is clinically important for risk stratification and individualized treatment.

In the Central Anatolia region, where local aerobiology and exposure profiles may differ from those in Mediterranean coastal regions, studies evaluating children with *C. arizonica* sensitization are limited in the literature. Accordingly, this study aimed to evaluate the demographic, clinical, and laboratory characteristics of pediatric patients with extract-defined *C. arizonica* sensitization in the Central Anatolia region of Türkiye, to compare mono- and polysensitized phenotypes, and to characterize their co-sensitization patterns.

MATERIALS and METHODS

Study Population and Design

This retrospective observational study was conducted at the Pediatric Allergy Outpatient Clinic of a tertiary care center. Medical records of 1560 patients aged 4–18 years who were diagnosed with allergic diseases, including asthma, allergic rhinitis, atopic dermatitis, and chronic urticaria, and who underwent skin prick testing between January 2024 and January 2025 were reviewed. Among these, 163 patients with *C. arizonica* sensitization identified by extract-based SPT were included in the study. Patients without a confirmed diagnosis of allergic disease or with incomplete demographic, clinical, or laboratory data were excluded.

Demographic and clinical data, including age, sex, clinical symptoms and severity, age at symptom onset, symptom pattern (seasonal vs. perennial), environmental exposures, and family history of allergic diseases, were extracted from the patients' electronic medical records.

Patients with allergic rhinitis and/or allergic rhinoconjunctivitis were evaluated for nasal and ocular symptoms at presentation according to the Allergic Rhinitis and Its Impact on Asthma (ARIA)-EAACI Guidelines.[11] Asthma was diagnosed according to the 2025 Global Initiative for Asthma (GINA) Strategy Report.[12] The evaluated clinical parameters included daytime and nocturnal symptoms, exercise-induced symptoms, the number of exacerbations in the previous year, and a history of hospitalization due to asthma exacerbations. In patients aged 6 years and older, lung function tests were performed, and forced expiratory volume in one second (FEV_1) and bronchodilator reversibility percentages were recorded. Chronic urticaria was diagnosed according to the International EAACI/GA²LEN/EuroGuiDerm/APAAACI Guideline for the Definition, Classification, Diagnosis, and Management of Urticaria.[13] The severity of atopic dermatitis was assessed using the Patient-Oriented SCORAD (PO-SCORAD) index.[14]

All patients underwent skin prick testing (SPT) with standardized aeroallergen extracts using two panels containing a total of 16 aeroallergens, administered at least two weeks apart. Skin prick tests were performed on the volar surface of the forearm using a standardized 1-mm lancet. Wheal diameters were measured after 20 minutes, and a wheal size ≥3 mm greater than the negative control was considered positive. Skin prick tests were performed using standardized commercial allergen extracts obtained from ApiPrick® (Asacpharma, Spain) and Lofarma® (Milan, Italy). In patients with asthma, SPTs were performed during periods of well-controlled asthma. In patients with atopic dermatitis, SPT was applied to eczema-free skin areas. In the chronic urticaria group, SPTs were conducted when symptoms were controlled and the patients were not taking antihistamine therapy.

The allergen panel included *C. arizonica*, timothy grass, cultivated grasses (*Hordeum, Secale, Triticum*), a tree pollen mixture (*Alnus, Corylus, Betula, Fraxinus*), *Ambrosia artemisiifolia, Parietaria, Plantago lanceolata, Artemisia vulgaris, Chenopodium*, a *Dermatophagoides* mixture, cockroach, cat dander, dog dander, *Alternaria alternata, Aspergillus fumigatus*, and *Cladosporium*.

Peripheral blood eosinophil count and percentage, total IgE, and allergen-specific IgE (sIgE) levels (grass pollen mixture, dust mixture, mold mixture, and cat dander) were measured in all patients. The grass pollen mixture sIgE included timothy grass, perennial rye grass, orchard grass, meadow fescue, and June grass. The dust mixture sIgE contained the allergens *Dermatophagoides pteronyssinus, Dermatophagoides farinae*, cockroach, and house dust-greer. The mold mixture sIgE contained *Alternaria tenuis, Cladosporium herbarum, Aspergillus fumigatus, Candida albicans*, and *Penicillium notatum*. Specific IgE levels were measured using a chemiluminescent immunoassay. The lower detection limit for all sIgE assays was 0.35 kIU/L.

Patients were classified into two groups based on SPT and/or sIgE results: a monosensitized group and a polysensitized group. Monosensitization was defined as sensitization exclusively to *C. arizonica*, demonstrated by a positive SPT to *C. arizonica*, with negative SPT results for all other aeroallergens in the 16-allergen panel and negative sIgE results (<0.35 kIU/L)

for all tested allergen mixtures and cat dander. Polysensitization was defined as sensitization to *C. arizonica* plus at least one additional aeroallergen, as determined by SPT and/or sIgE. Co-sensitization was defined as concomitant sensitization to *C. arizonica* and one or more additional aeroallergens.

Ethical approval was obtained from the hospital's ethics committee on September 24, 2025, with protocol number 2024-BÇEK/351. This study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics (Version 26.0; IBM Corporation, Armonk, New York, USA). Descriptive statistics, including frequency and percentage distributions, were used to analyze the data. The normality of the data distribution was evaluated using the Shapiro–Wilk test. The chi-square test or Fisher's exact test was used to compare categorical variables. The Mann–Whitney U test was used to compare quantitative data between two groups. Statistical significance was accepted as $p<0.05$.

RESULTS

A total of 163 (10.4%) patients with sensitization to *C. arizonica* were identified among 1560 individuals who underwent SPT. Among sensitized patients, 38 (23.3%) were monosensitized and 125 (76.7%) were polysensitized.

Ninety-eight (60.1%) of the patients were male. Sex distribution did not differ between the monosensitized and polysensitized groups (p=0.19). Median current age was also similar (122.5 months [IQR 96.7–165] vs. 138 months [IQR 101.5–180.5], p=0.34). In contrast, polysensitized patients had an earlier age at symptom onset than monosensitized patients (median 89 months [IQR 72–101.5], p=0.03). Among patients sensitized to *C. arizonica*, 54.6% reported seasonal symptoms, whereas 45.4% reported perennial symptoms. Symptom patterns (seasonal or perennial) were comparable between the groups (p=0.46). Detailed demographic and clinical characteristics are summarized in Table 1.

Allergic rhinitis/rhinoconjunctivitis was the most frequent allergic disease and was more common in polysensitized patients (84.8%) than in monosensitized patients (52.6%, p=0.01). In contrast, the frequencies of asthma, atopic dermatitis, and chronic urticaria were similar between the groups (all p>0.05). The number of allergic diseases (single vs. multiple) did not differ significantly between the monosensitized and polysensitized groups (p=0.33). Current allergic rhinitis/rhinoconjunctivitis and asthma symptoms, the number of asthma exacerbations per year, hospitalization due to exacerbations, and lung function parameters (FEV_1 and reversibility percentage) were also comparable between monosensitized and polysensitized patients (all reported p>0.05, Table 1). Among patients with atopic dermatitis, median PO-SCORAD scores were comparable between the monosensitized and polysensitized groups (p=0.81).

Environmental and familial factors, including pet ownership, tobacco smoke exposure, and family history of allergy, did not differ significantly between the groups (all p>0.05).

C. arizonica SPT wheal diameters did not differ significantly between monosensitized and polysensitized children (p=0.66). Total IgE levels were higher in polysensitized patients (median 259.5 IU/mL [IQR 130–585.4]) than in monosensitized patients (median 85 IU/mL [IQR 31–137], p=0.01). Absolute eosinophil counts and percentages (median 360 [IQR 180–480] and 3.5% [IQR 2.1–5.7], respectively) were higher in the polysensitized group (p<0.05 for both). The distribution of SPT and laboratory parameters according to sensitization status is shown in Table 2.

Among polysensitized children, co-sensitization was most frequently observed for timothy grass (75.2%), followed by cultivated grasses (65.6%) and cat dander (54.4%). Sensitization to other allergens—including weed and other tree pollens, house dust mites, and molds—occurred less frequently. The co-sensitization profile of polysensitized patients is presented in Table 3.

Median allergen-specific IgE levels differed markedly between monosensitized and polysensitized patients. In the monosensitized group, median sIgE levels were 0.1 kU/L [0.1–0.2] for grass mixture, dust mixture, and mold mixture and 0.1 kU/L [0.1–0.1] for cat dander. In polysensitized patients, median sIgE levels were 63.7 kU/L [20.9–100] for grass mixture in those with grass/weed/tree pollen sensitization, 4.6 kU/L [1.3–15.6] for dust mixture in those with house dust mite sensitization, 2.7 kU/L [1.1–11.9] for mold mixture in those with mold sensitization, and 10.8 kU/L [0.7–95.1] for cat dander in those with cat sensitization.

DISCUSSION

In this study conducted in the Central Anatolia region, sensitization to *C. arizonica* was identified in 10.4% of pediatric patients presenting to a tertiary allergy clinic with allergic symptoms. Our findings indicate that *C. arizonica* sensitization is relatively common among children in Central Anatolia, and the observed prevalence was higher than the 7.5% reported in a pediatric cohort from the same region approximately a decade earlier.[15] This increase may be related to environmental changes, such as an increase in the number of

Table 1. Demographic and clinical characteristics of the study population

	All patients n=163	Monosensitized n=38	Polysensitized n=125	p
Male sex, n (%)	98 (60.1)	20 (52.6)	78 (62.4)	0.19
Current age, median [IQR], months	136 [100–180]	122.5 [96.7–165]	138 [101.5–180.5]	0.34
Age at symptom onset, median [IQR], months	91 [72–114]	98 [72–123.3]	89 [72–101.5]	0.03
Symptom pattern, n (%)				0.46
Seasonal	89 (54.6)	20 (52.6)	69 (55.2)	
Perennial	74 (45.4)	18 (47.4)	56 (44.8)	
Allergic diseases, n (%)				
AR/RC	126 (77.3)	20 (52.6)	106 (84.8)	0.01
Asthma	66 (40.5)	15 (39.5)	51 (40.8)	0.52
AD	41 (25.1)	12 (31.6)	29 (23.2)	0.20
CU	19 (11.7)	7 (18.4)	12 (9.6)	0.12
Number of Allergic Diseases, n (%)				0.33
Single allergic disease	87 (53.4)	22 (57.9)	65 (52.0)	
Multiple allergic diseases	76 (46.6)	16 (42.1)	60 (48.0)	
AR/RC + Asthma	36 (21.8)	5 (13.2)	31 (24.8)	
AR/RC + AD	17 (10.3)	4 (10.5)	13 (10.4)	
Asthma + AD	5 (3.0)	4 (10.5)	1 (0.8)	
AR/RC + Asthma + AD	9 (5.5)	–	9 (7.2)	
CU + additional allergic diseases	9 (5.5)	3 (7.9)	6 (4.8)	
Current AR/RC symptoms, n (%)	113 (69.3)	20 (52.6)	93 (74.4)	0.28
Rhinorrhea	80 (49.1)	11 (28.9)	69 (55.2)	0.20
Itchy nose	83 (50.9)	16 (42.1)	67 (53.6)	0.19
Nasal congestion	88 (54.0)	16 (42.1)	72 (57.6)	0.32
Sneezing	84 (51.5)	14 (36.8)	70 (56.0)	0.59
Eye symptoms	70 (42.9)	12 (31.6)	58 (46.4)	0.53
Current Asthma symptoms, n (%)				
Daytime symptoms	30 (18.4)	6 (15.8)	24 (19.2)	0.43
Nighttime symptoms	31 (19.0)	6 (15.8)	25 (20.0)	0.38
Exercise-related symptoms	50 (30.6)	10 (26.3)	40 (32.0)	0.27
Asthma exacerbations/year, median [IQR]	2 [1–2]	2 [1–2]	2 [1–2]	0.34
Hospitalization due to asthma exacerbations, n (%)	22 (13.5)	4 (10.5)	18 (14.4)	0.38
FEV_1, median [IQR], %	86 [74.5–95.5]	90 [82–100]	85.5 [74–95]	0.27
Bronchodilator reversibility, median [IQR], %	14 [12–17]	12.5 [7.5–15.5]	14 [12–17]	0.24
PO-SCORAD index, median [IQR]	19.5 [6.5–33]	18 [6.8–33]	19.5 [6.1–33.8]	0.81
Any pet ownership, n (%)	45 (27.6)	11 (28.9)	34 (27.2)	0.49
Tobacco exposure, n (%)	96 (58.9)	20 (52.6)	76 (60.8)	0.24
Family history of allergy, n (%)	66 (40.5)	17 (44.7)	49 (39.2)	0.34

IQR: Interquartile range; AR: Allergic rhinitis; RC: Rhinoconjunctivitis; AD: Atopic dermatitis; CU: Chronic urticaria; FEV_1: Forced expiratory volume in one second

Cupressus trees in urban landscapes and changes in pollen exposure due to climate change, as well as differences in the study population.[2,3,5,16] However, because SPT was performed exclusively in patients presenting with allergic symptoms, the observed sensitization rate should not be interpreted as representative of the prevalence in the general population.

Table 2. Median values of the Cupressus arizonica skin prick test wheal diameter and laboratory parameters

	All patients n=163	Monosensitized n=38	Polysensitized n=125	p
SPT wheal diameter, median [IQR], mm	4 [3–5]	4 [3–5]	4 [3–5]	0.66
Total IgE, median [IQR], IU/ml	226 [94.8–565.4]	85 [31–137]	259.5 [130–585.4]	0.01
Eosinophil count, median, [IQR], cells/mm^3	310 [160–470]	180 [140–420]	360 [180–480]	0.01
Eosinophil percentage, median [IQR]	3.3 [1.9–5.3]	2.3 [1.4–4.3]	3.5 [2.1–5.7]	0.02

IQR: Interquartile range; SPT: Skin prick testing

C. arizonica sensitization most commonly presents clinically as rhinitis or rhinoconjunctivitis.[2,3,17] In this study, allergic rhinitis or rhinoconjunctivitis was the most prevalent clinical manifestation among patients sensitized to *C. arizonica* (77.3%), followed by asthma (40.5%), atopic dermatitis (25.1%), and chronic spontaneous urticaria (11.7%). In a study evaluating pediatric patients predominantly residing in the Central Anatolia region of Türkiye, allergic rhinitis was reported in 89.5%, asthma in 35.8%, and atopic dermatitis in 29.8% of children sensitized to *C. arizonica*.[3] Similarly, another study conducted in the Mediterranean region reported a prevalence of allergic rhinoconjunctivitis of 90.5% in individuals with isolated *Cupressus* allergy.[17] The lower prevalence of allergic rhinitis/rhinoconjunctivitis in our cohort compared with that reported in the literature may reflect the inclusion of a broader clinical spectrum, including atopic dermatitis and chronic spontaneous urticaria in addition to respiratory allergies. These findings indicate that *C. arizonica* sensitization may coexist with various allergic diseases beyond rhinitis/rhinoconjunctivitis; however, no direct association with nonrespiratory allergic diseases can be inferred from the present data.

Cupressaceae sensitization rarely occurs in isolation and is typically part of a broader atopic profile.[3,18] Although monosensitization rates to Cupressaceae pollens have been reported to range from 3% to 14.7%, the higher rate observed in our cohort (23.3%) may reflect differences in study population characteristics and regional variations in aeroallergen exposure.[3,18]

Analysis of the co-sensitization profile revealed that the most frequent sensitizations among polysensitized patients were to timothy grass (75.2%), cultivated grasses (65.6%), and cat dander (54.4%). This pattern suggests that *C. arizonica* sensitization frequently coexists with both seasonal and perennial aeroallergens, including indoor allergens such as cat dander, emphasizing the need for comprehensive allergen evaluation. The Eastern Mediterranean Turkish study likewise reported grass, cat, and weed pollens as the most common additional sensitizations.[3]

Table 3. Allergen co-sensitization profile in polysensitized patients

Co-allergen type	n (%)
Timothy	94 (75.2)
Cultivated grasses (Hordeum, Secale, Triticum)	82 (65.6)
Cat dander	68 (54.4)
Ambrosia artemisiifolia	30 (24.0)
Dust mite mix	25 (20.0)
Plantago lanceolata	20 (16.0)
Artemisia vulgaris	19 (15.2)
Tree pollen mixture	17 (13.6)
Chenopodium	16 (12.8)
Alternaria alternata	15 (12.0)
Dog dander	6 (4.8)
Parietaria	4 (3.2)
Cockroach	4 (3.2)
Aspergillus fumigatus	3 (2.4)
Cladosporium	–

This study further demonstrated that, among pediatric patients sensitized to *C. arizonica*, polysensitization was associated with distinct clinical characteristics compared with monosensitization. Polysensitized children exhibited an earlier onset of allergic symptoms and a higher prevalence of allergic rhinitis/rhinoconjunctivitis, accompanied by elevated total IgE levels and eosinophil counts and percentages, indicative of a more pronounced type 2 inflammatory profile.

Previous studies have reported that polysensitization is associated with older age, higher IgE levels, and more persistent and severe symptoms.[8,18,19] In addition, several studies have demonstrated a positive correlation between the number of sensitizing allergens and the severity of IgE-mediated symptoms.[19] However, our findings partially diverge from the existing literature. In our cohort, neither polysensitization nor the number of sensitizing allergens was significant-

ly associated with the severity of asthma, allergic rhinitis/rhinoconjunctivitis, or atopic dermatitis. This may indicate that disease severity is determined not only by the number of sensitizations but also by multifactorial mechanisms such as genetic predisposition and environmental exposure. Furthermore, the similar distribution of seasonal and perennial symptoms between the monosensitized and polysensitized groups may reflect the prolonged and regionally variable pollination period of *C. arizonica*.[2]

The inclusion of a relatively large cohort of pediatric patients with extract-defined *C. arizonica* sensitization in this study increases the clinical significance of the findings by allowing direct comparison of monosensitized and polysensitized phenotypes. Furthermore, as one of the few studies demonstrating an increasing trend in *C. arizonica* sensitization in the Central Anatolia region, this study contributes to the existing literature. However, several limitations should be considered. The lack of component-resolved diagnostics, particularly Cup a 1-specific IgE, limits the ability to distinguish primary sensitization from cross-reactivity, especially in polysensitized patients. Although all patients had allergy diagnoses confirmed by allergy and immunology specialists, the relationship between *C. arizonica* sensitization and clinically relevant allergic symptoms could not be clearly evaluated. The absence of functional validation methods, such as nasal provocation testing, further restricts interpretation. Furthermore, because the definition of monosensitization was based solely on a predefined aeroallergen panel and the available allergen-specific IgE data, the possibility of sensitization to untested allergens represents an additional limitation of the study. Finally, the retrospective, single-center design in a tertiary care setting may introduce referral bias and limit generalizability.

CONCLUSION

In conclusion, *C. arizonica* sensitization is increasingly prevalent in children, and the high rate of co-sensitization underscores the importance of comprehensive aeroallergen assessment in this population. Monosensitization and polysensitization patterns may exhibit distinct clinical characteristics. Although polysensitized patients tend to show earlier symptom onset and a higher prevalence of allergic rhinitis/rhinoconjunctivitis, the lack of a direct association between the number of sensitizations and disease severity underscores the multifactorial nature of allergic diseases. Prospective, multicenter studies incorporating component-resolved diagnostics and functional validation are needed to better delineate the true clinical relevance of *C. arizonica* sensitization and its cross-reactivity profiles.

Disclosures

Ethics Committee Approval: The study was approved by the The Atatürk Sanatorium Training and Research Hospital Ethics Committee (No: 2024-BÇEK/351, Date: 24/09/2025).

Informed Consent: Since the study is retrospective, informed consent was not obtained.

Conflict of Interest Statement: The authors declare that there is no conflict of interest.

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REFERENCES

1. Epstein TEG, Rorie AC, Ramon GD, Keswani A, Bernstein J, Codina R, et al. Impact of climate change on aerobiology, rhinitis, and allergen immunotherapy: Work Group Report from the Aerobiology, Rhinitis, Rhinosinusitis & Ocular Allergy, and Immunotherapy, Allergen Standardization & Allergy Diagnostics Committees of the American Academy of Allergy, Asthma & Immunology. J Allergy Clin Immunol 2025;155:1767–82.e2. [CrossRef]
2. Charpin D, Pichot C, Belmonte J, Sutra JP, Zidkova J, Chanez P, et al. Cypress Pollinosis: from Tree to Clinic. Clin Rev Allergy Immunol 2019;56:174–95. [CrossRef]
3. Ünsal H, Şahiner ÜM, Soyer Ö, Şekerel BE. Cupressus arizonica: an emerging aeroallergen for East Mediterranean children. Turk J Med Sci 2023;53:1262–70. [CrossRef]
4. Asero R, Ceriotti V, Bonini M. Cypress pollen allergy in Milan: the story of an ongoing growth. Eur Ann Allergy Clin Immunol 2021;53:209–13. [CrossRef]
5. Biçakçi A, Tosunoğlu A. Allergenic pollens in Turkey. Asthma Allergy Immunol 2019;17:7–24. [CrossRef]
6. Chico-Fernández J, Feliu Vila A, Rodríguez-Jiménez B, Valbuena Garrido T, Ayuga-Téllez E. Influence of atmospheric pollutants on allergic sensitization to cupressaceae, Olea, and Platanus pollen in the community of Madrid (2017–2021). Life (Basel) 2025;15:1774. [CrossRef]
7. Charpin D, Calleja M, Pichot C, Penel V, Hugues B, Poncet P. Cypress pollen allergy. Rev Mal Respir 2013;30:868–78. [CrossRef]
8. Bakır DB, Yağmur H, Kabadayı G, Boyacıoğlu ÖK, Atay Ö, Asilsoy S, et al. Demographics and clinical features of pediatric patients with allergic rhinitis: a single-center study from Western Turkey. BMC Pediatr 2025;25:170. [CrossRef]
9. Ciprandi G, Cirillo I. Monosensitization and polysensitization in allergic rhinitis. Eur J Intern Med 2011;22–9. [CrossRef]
10. Raciborski F, Bousquet J, Bousqet J, Namysłowski A, Krzych-Fałta E, Tomaszewska A, et al. Dissociating polysensitization and multimorbidity in children and adults from a Polish general population cohort. Clin Transl Allergy 2019;9:4. [CrossRef]

11. Bousquet J, Sousa-Pinto B, Vieira RJ, Schünemann HJ, Zuberbier T, Bognanni A, et al. Methodology for the development of the Allergic Rhinitis and Its Impact on Asthma (ARIA)-EAACI 2024–2025 Guidelines: from evidence-to-decision frameworks to digitalised shared decision-making algorithms. Allergy 2026;81:427–53. [CrossRef]
12. Global Initiative for Asthma (GINA). 2025 GINA strategy report. Global Initiative for Asthma; 2025. Available at: https://ginasthma.org/2025-gina-strategy-report/. Accessed September 22, 2026.
13. Zuberbier T, Abdul Latiff AH, Abuzakouk M, Aquilina S, Asero R, Baker D, et al. The international EAACI/GA²LEN/EuroGuiDerm/APAAACI guideline for the definition, classification, diagnosis, and management of urticaria. Allergy 2022;77:734–66. [CrossRef]
14. Stalder JF, Barbarot S, Wollenberg A, Holm EA, De Raeve L, Seidenari S, et al. Patient-Oriented SCORAD (PO-SCORAD): a new self-assessment scale in atopic dermatitis validated in Europe. Allergy 2011;66:1114–21. [CrossRef]
15. Cavkaytar O, Buyuktiryaki B, Sag E, Soyer O, Sekerel BE. What we miss if standard panel is used for skin prick testing? Asian Pac J Allergy Immunol 2015;33:211–21. [CrossRef]
16. Rottem M, Noujedat M, Awni Y. Sensitizations to aeroallergens in Israel: Prevalences and profiles. Allergol Immunopathol (Madr) 2025;53:101–11. [CrossRef]
17. Alonso-Díaz de Durana MD, Pérez-Fernández E, Villalba M, Martín-Pedraza L, Fernández-Rivas M. Allergy to cypress and olive pollen: clinical phenotypes and allergen recognition. J Investig Allergol Clin Immunol 2024 3;34:313–22. [CrossRef]
18. Italian Association of Aerobiology. An epidemiological survey of Cupressaceae pollenosis in Italy. J Investig Allergol Clin Immunol 2002;12:287–92.
19. Ha EK, Baek JH, Lee SY, Park YM, Kim WK, Sheen YH, et al. Association of polysensitization, allergic multimorbidity, and allergy severity: a cross-sectional study of school children. Int Arch Allergy Immunol 2016;171:251–60. [CrossRef]