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Research

Evaluation of Symptoms and Factors Associated with Symptom Severity in Children with Allergic Rhinitis

Alerjik Rinitli Çocuklarda Semptomların ve Semptom Şiddeti ile İlişkili Faktörlerin Değerlendirilmesi

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ABSTRACT

Objective: Allergic rhinitis (AR) is a common childhood disease characterized by immunoglobulin E (IgE)-mediated inflammation of the nasal mucosa. Manifesting with nasal and ocular symptoms, this condition also adversely affects quality of life. This study aimed to evaluate symptom severity and identify clinical and laboratory factors associated with it in children diagnosed with AR.

Methods: This cross-sectional study was conducted between August and October 2025 at the Pediatric Allergy Clinic of İzmir City Hospital. A total of 260 children aged 6-18 years who were followed up with a diagnosis of AR and had a positive skin prick test were included. Demographic characteristics, symptoms, Allergic Rhinitis and its Impact on Asthma-based classifications according to severity and duration, sensitization patterns, total IgE, and eosinophil levels were recorded. Symptom severity was assessed using nasal and ocular visual analogue scale (VAS). Data were analyzed using SPSS software (IBM SPSS Statistics, version 27). Appropriate statistical tests were used for group comparisons and correlation analyses. A p-value of <0.05 was considered statistically significant.

Results: Of the patients included, 62.7% were male, with a mean age of 11.7±4.8 years. The most common sensitization was to pollen (66.2%). Among the participants, 56.9% were polysensitized, 66.2% were classified as having moderate-to-severe AR, and 53.1% had the persistent type. The mean nasal VAS score was 5.55±2.17, and the mean ocular VAS score was 3.6±3.6. Nasal symptom scores were significantly higher than ocular symptom scores (p<0.001). VAS scores were also significantly higher in polysensitized, moderate-to-severe, and persistent AR patients (p<0.05).

Conclusion: In children with AR, symptom severity is closely associated with disease phenotype and sensitization patterns. The use of VAS scores in clinical evaluation may facilitate objective assessment of symptom burden and contribute to the individualization of treatment strategies.

Keywords: Allergic rhinitis, allergy, child, symptoms, visual analogue scale

ÖZ

Amaç: Alerjik rinit (AR), çocukluk çağında sık görülen burun mukozasının immünoglobulin E (IgE) aracılı enflamasyonu ile karakterize bir hastalıktır. Nazal ve oküler semptomlarla kendini gösteren bu hastalık, yaşam kalitesini de olumsuz etkilemektedir. Bu çalışmanın amacı, AR tanılı çocuklarda semptomların şiddetini değerlendirmek ve semptom şiddetiyle ilişkili klinik ve laboratuvar faktörleri belirlemektir.

Gereç ve Yöntem: Kesitsel nitelikteki bu çalışma, Ağustos-Ekim 2025 tarihleri arasında İzmir Şehir Hastanesi Çocuk Alerji Kliniği'nde gerçekleştirildi. Çalışmaya, 6-18 yaş arasında olan, AR tanısıyla izlenen ve deri prick testi pozitif 260 çocuk dahil edildi. Hastaların demografik özellikleri, semptomları Alerjik Rinit ve Astım Üzerindeki Etkileri sınıflamasına göre ağırlık ve süre dağılımları, duyarlanma örüntüsü, total IgE ve eozinofil düzeyleri kaydedildi. Semptom şiddeti nazal ve oküler görsel analog skala (GAS) ile değerlendirildi. Veriler SPSS (IBM SPSS Statistics, sürüm 27) yazılımı ile analiz edildi; uygun istatistiksel testler kullanılarak gruplar arası karşılaştırmalar ve korelasyon analizleri yapıldı. p<0,05 değeri istatistiksel olarak anlamlı kabul edildi.

Bulgular: Çalışmaya katılan hastaların %62,7'si erkekti ve ortalama yaş 11,7±4,8 yıl idi. En sık duyarlanma polen (%66,2) ile saptandı. Hastaların %56,9'u polisensitize, %66,2'si orta-ağır AR grubunda, %53,1'i persistan tipteydi. Ortalama nazal GAS skoru 5,55±2,17, oküler GAS skoru 3,6±3,6 bulundu. Nazal semptom skorları oküler semptom skorlarından yüksekti (p<0,001). Polisensitize, orta-ağır ve persistan tipteki hastalarda da GAS skorları anlamlı şekilde yüksek bulundu (p<0,05).

Sonuç: Alerjik rinitli çocuklarda semptom şiddeti, hastalığın fenotipi ve duyarlanma örüntüleriyle yakından ilişkilidir. GAS skorunun klinik değerlendirmede kullanılması, semptomlar, yükünün objektif olarak belirlenmesine ve tedavi stratejilerinin bireyselleştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Alerjik rinit, alerji, çocuk, semptomlar, görsel analog skala

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INTRODUCTION

Allergic rhinitis (AR) is an inflammatory disease of the nasal mucosa associated with hypersensitivity to environmental allergens mediated by immunoglobulin E (IgE) (1). While it is observed in 10-40% of the pediatric population worldwide, studies conducted across different regions of Türkiye show that the prevalence ranges from 18% to 43% (2-4).

Sneezing, nasal congestion, clear nasal discharge, nasal itching, and watery, itchy eyes are the most common symptoms in patients with AR (1). Among patients, the phenotype of symptoms and their timing and duration can vary. Studies have generally shown that nasal symptoms are more prominent than ocular symptoms (5,6). In some patients with AR, complaints occur seasonally, while in others, they are perennial; some of these patients with perennial complaints experience seasonal exacerbations. Additionally, symptom severity varies among patients with AR (7). Additionally, AR may be accompanied by other allergic diseases, such as atopic dermatitis and asthma, and comorbidities, including gastro-oesophageal reflux, sinusitis, and otitis media (8).

AR impairs quality of life and causes morbidity (9). To define the burden caused by AR, the Allergic Rhinitis and its Impact on Asthma (ARIA) classification has been introduced. AR is classified as mild or moderate-to-severe by symptom severity, and as persistent or intermittent by duration (10). Various scoring systems can be used to assess symptom severity in children. These scoring systems guide the objective recording of patients' subjective experiences and the monitoring of treatment effectiveness (7).

The sensitization patterns of children with AR vary regionally; however, sensitization to house dust mites, pollen, molds, and pet epithelia is most commonly detected (5,11,12). Additionally, the polysensitization rate among patients with AR exceeds 50% (5,13). Studies have shown that monosensitized patients have milder symptoms and a less impaired quality of life than polysensitized patients (14,15).

AR in children is a disease that varies widely in terms of sensitization profile, symptom distribution, and clinical severity. A better understanding of clinical diversity and symptom patterns is of great importance for disease management and for personalized treatment strategies (16). This study aims to evaluate the patterns and severity of symptoms, and the factors affecting symptoms in children diagnosed with AR.

METHODS

Our study was cross-sectional, conducted at the İzmir City Hospital Children's Allergy Clinic from August 2024 to October 2025. Ethical approval for the non-interventional study, planned in accordance with the Helsinki Declaration, was obtained from the Non-Interventional Ethics Committee of the İzmir City Hospital (approval no: 2025/390, date: 10.09.2025). The sample size was calculated for 80% power, α=0.05, and an effect size (d) of 0.80; the planned sample size was 260 patients.

The study included children aged 6-18 years who were being followed up for a diagnosis of AR and who presented during the period of peak symptom severity. Inclusion criteria were a positive skin prick test, no AR-specific treatment within the past three months, and agreement by both the children and their parents to participate in the study. Each patient was evaluated during the season associated with the allergen to which they were allergic. Children under 6 years of age, those who had received treatment for AR within the previous three months, and those who declined to participate were excluded from the study. Detailed information regarding the study was provided to all eligible patients and their parents, and written informed consent was obtained prior to enrollment. A structured case report form was used to record the patients' age, sex, duration of symptoms, age at symptom onset, current complaints, symptom period, ARIA classification group, physical examination findings, and laboratory results (serum total IgE, skin prick test results, and eosinophil counts). The visual analogue scale (VAS) was used for the evaluation of symptoms. In this scoring system, nasal symptoms (sneezing, nasal discharge, nasal itching, and nasal congestion) and ocular symptoms (watery, itchy, and red eyes) were assessed. For each symptom, patients were asked to rate the severity of their experience on a VAS ranging from 0 (no symptom) to 10 (most severe). The mean VAS scores were calculated both for each individual symptom and for grouped nasal and ocular symptoms, and the results were reported accordingly. The ARIA classification was used to assess the severity and duration of AR symptoms. According to this classification, symptoms lasting more than 4 days per week and persisting more than 4 weeks were classified as persistent, while shorter durations were classified as intermittent. In addition, patients with no sleep disturbance, no impairment in daily activities or school performance, and no bothersome symptoms were classified as having mild disease, whereas the presence of at least one of these features indicated moderate-to-severe disease. Symptoms occurring year-round were classified as

perennial, whereas those appearing during specific seasons were classified as seasonal. An eosinophil count greater than 500/mm³ was considered eosinophilia. The results of skin-prick tests performed with extracts of pollen (*Plantago lanceolata*, *Olea europaea*, grass mix, *Chenopodium album*, *Artemisia vulgaris*); mites (*Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*); molds (*Alternaria alternata*, *Cladosporium herbarum*, *Aspergillus fumigatus*); and animal epithelia (cat, dog, and cockroach) were recorded. A wheal diameter at least 3 mm greater than that of the negative control was considered positive.

Statistical Analysis

The data obtained from the study were analyzed using IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean±standard deviation or median [interquartile range (IQR)] for continuous variables and as percentages for categorical variables. The normality of data distribution was assessed using the Kolmogorov-Smirnov or Shapiro-Wilk tests. For continuous variables with a normal distribution, group comparisons were performed using the Student's t-test or one-way analysis of variance (ANOVA). When ANOVA results indicated significant differences, pairwise comparisons between groups were conducted using the Tukey's honest significant difference post-hoc test. For continuous variables that were not normally distributed, the Mann-Whitney U test or the Kruskal-Wallis test was applied. Associations between categorical variables were analyzed using the chi-square test. The relationship between VAS scores and allergen sensitization profiles was evaluated using Spearman's correlation analysis. A p-value of <0.05 was considered statistically significant in all analyses.

RESULTS

A total of 260 patients with AR were included in the study. Of these, 163 were male (62.7%) and 97 were female (37.3%), with a mean age of 11.7±4.8 years. The mean age at symptom onset was 7.1±3.4 years, and the mean duration of symptoms was 4.3±2.9 years. According to the ARIA severity classification, 88 patients (33.8%) had mild AR and 172 (66.2%) had moderate-to-severe AR; based on symptom duration, 122 patients (46.9%) were classified as intermittent and 138 (53.1%) as persistent. Complaints were seasonal in 101 patients (38.8%), perennial in 41 (15.8%), and perennial with seasonal exacerbations in 118 (45.4%). The general characteristics of the patients are summarized in Table 1.

When the patients' laboratory findings were evaluated, the median total IgE level was 366.0 IU/mL (IQR: 358.5 IU/mL) and the mean eosinophil count was 382.7±449.1/mm³. Eosinophilia was present in 61 patients (23.5%). Among the patients, 112 (43.1%) were monosensitized, whereas 148 (56.9%) were polysensitized. Sensitization to pollens was the most common (172 patients, 66.2%), followed by sensitization to animal allergens (140 patients, 53.8%), molds (83 patients, 31.9%), and mites (101 patients, 38.8%) (Table 2).

Analysis of individual nasal symptom VAS scores revealed that nasal congestion was the most severe symptom (6.1±3.1), followed by nasal discharge (5.7±3.1), nasal itching (5.2±2.9), and sneezing (5.1±2.7). Among ocular

Table 1. Demographic and clinical characteristics of the patients

Sex (M/F), n (%)		163 (62.7) / 97 (373)
Age, years (mean±SD)		11.7±4.8
Age at symptom onset, years (mean±SD)		7.1±3.4
Duration of symptoms, years (mean±SD)		4.3±2.9
Family history of atopy, n (%)		145 (55.8)
Presence of pets at home, n (%)		65 (25)
Exposure to cigarette smoke, n (%)		145 (55.8)
Comorbid allergic diseases, n (%)		
Asthma		129 (49.6)
Atopic dermatitis		51 (19.6)
AR classification, n (%)		
By severity	Mild	88 (33.8)
	Moderate-to-severe	172 (66.2)
By duration	Intermittent	122 (46.9)
	Persistent	138 (53.1)
AR classification by symptom timing, n (%)		
Seasonal		101 (38.8)
Perennial		41 (15.8)
Perennial with seasonal exacerbations		118 (45.4)

SD: Standard deviation, AR: Allergic rhinitis, M/F: Male/female

Table 2. Laboratory characteristics of the patients

Total IgE [IU/mL, (IQR)]	366.0 (358.5)
Eosinophil count (cells/mm³, mean±SD)	382.7±449.1
Presence of eosinophilia, n (%)	61 (23.5)
Sensitization pattern, n (%)	
Monosensitization	112 (43.1)
Polysensitization	148 (56.9)
Allergen sensitization, n (%)*	
Pollens	172 (66.2)
Animal dander	140 (53.8)
Molds	83 (31.9)
House dust mites	101 (38.8)

*: Percentages for allergen sensitization may exceed 100% because some patients were sensitized to multiple allergens, SD: Standard deviation, IQR: Interquartile range, IgE: Immunoglobulin E

symptoms, ocular itching was the most prominent (3.9±3.4), followed by watery eyes (3.5±3.2) and ocular redness (3.3±3.3) (Figure 1).

Evaluation of VAS scores by grouping symptoms into nasal and ocular categories showed a mean VAS score for nasal symptoms of 5.5±2.1, whereas the mean VAS score for ocular symptoms was 3.6±3.6. VAS scores for nasal symptoms were significantly higher than those for ocular symptoms ($p<0.001$). Analysis of patients by sensitization pattern revealed that both nasal and ocular VAS scores were significantly higher in polysensitized than in monosensitized patients ($p<0.05$). Regarding AR severity, patients with moderate-to-severe AR exhibited higher nasal and ocular VAS scores than those with mild AR. Additionally, VAS scores were higher in patients with persistent AR. Overall, nasal symptom scores were higher than ocular symptom scores (Table 3).

DISCUSSION

Our study demonstrates that children with polysensitized, moderate-to-severe, persistent AR exhibit more severe nasal and ocular symptoms. Additionally, symptom scores were higher in children with perennial AR, particularly in those with seasonal exacerbations. Nasal congestion was the most prominent nasal symptom, whereas ocular itching was the most severe ocular symptom.

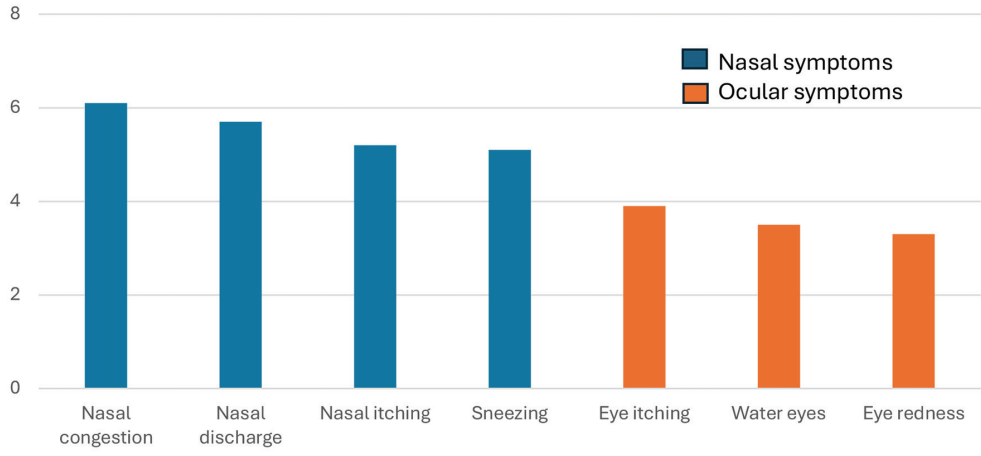

Figure 1. Nasal symptoms and ocular symptoms VAS scores of the patients
VAS: Visual analogue scale

Table 3. Evaluation of nasal and ocular symptom VAS scores according to clinical characteristics

	Ocular symptom-VAS results (mean±SD)		Nasal symptom-VAS results (mean±SD)	
Sensitization pattern				
Monosensitization	3.0±2.8	p=0.01	5.2±2.2	p=0.03
Polysensitization	4.1±4.0		5.7±2.0	
AR classification by severity				
Mild	2.5±2.8	p<0.001	4.7±2.1	p<0.001
Moderate-to-severe	4.2±3.8		5.9±2.0	
AR classification by duration				
Intermittent	3.0±2.9	p=0.005	4.8±2.1	p<0.001
Persistent	4.2±4.0		6.1±2.0	
AR classification by symptom timing				
Seasonal	2.8±2.9	p (ANOVA)=0.006*	4.8±2.0	p (ANOVA)=0.000**
Perennial	3.8±3.1		5.9±2.1	
Perennial with seasonal exacerbations	4.3±4.1		6.0±2.1	

*: Significant difference between the seasonal and perennial with seasonal exacerbations groups (Tukey post-hoc test, p=0.004), **: Significant differences were observed between the seasonal and perennial groups (Tukey post-hoc test, p=0.015) and between the seasonal and perennial with seasonal exacerbations groups (Tukey post-hoc test, p<0.001)
VAS: Visual analogue scale, ANOVA: Analysis of variance, AR: Allergic rhinitis

Ciğerci Günaydın et al. (17) reported in a study of 266 children with AR that the proportion of polysensitized patients was 45.1%. In a study conducted in China, including 4,279 patients with AR, the proportion of polysensitized patients was 60.11%, whereas another study in Greece, which involved 231 patients, reported 59.7% (5,18). In our study, consistent with the literature, polysensitized patients were more prevalent than monosensitized patients.

In a study by Filiz et al. (19) of children with AR, the mean nasal symptom score was 7.94±5.58, whereas the mean ocular symptom score was 2.23±1.75. Similarly, in our study, nasal symptoms were more prominent among the patients. A study of 1,054 children with AR found that nasal congestion affected approximately 70% of those with moderate-to-severe AR. This study also emphasized that nasal congestion is the most important symptom of AR (20). Similarly, in our study, the most severe symptom was found to be nasal congestion.

In a study of 619 children with asthma, 93.5% of whom also had AR, 37.8% experienced perennial symptoms with seasonal exacerbations, while 5.4% had purely perennial symptoms (21). In another study, 20% of symptoms were reported as seasonal, while 61.4% were perennial. In our study, 45.4% of patients had perennial symptoms with seasonal exacerbations, and 15.8% had exclusively perennial symptoms (22). A study of 75 children with AR found that VAS scores were higher in children with perennial symptoms than in those with seasonal symptoms. The same study also found that patients with moderate-to-severe AR had higher nasal and ocular VAS scores than those with mild AR (23). In our study, patients with AR who experienced perennial symptoms with seasonal exacerbations demonstrated higher nasal and ocular VAS scores than those with seasonal only or purely perennial symptoms. Furthermore, patients with moderate-to-severe AR had higher nasal and ocular VAS scores than those with mild AR. These findings are likely attributable to the high prevalence of polysensitization and pollen sensitization among the patients.

A multicenter study in Spain that included 1,269 children (aged 6-12 years) with AR reported that 59.5% of the children had intermittent AR and 89.9% had moderate-to-severe AR. The study also found that participants were most commonly sensitized to pollen (53.5%) (24). Another study conducted in China that included 1,054 children with AR reported that 19.2% of the children had intermittent AR and 57.3% had moderate-to-severe AR. In this study, sensitization to house dust mites was most common (20). In a study conducted in Greece that included 675 school-aged children, sensitization was most commonly to house dust and second most commonly to pollen (5). Sensitization was reported to be most common to pollen, with house dust mites the second most frequent, in a study conducted in Türkiye (25). In our study, 46.9% of patients had intermittent AR and 66.2% had moderate-to-severe AR; sensitization was most commonly observed to pollen (66.2%). These results support the notion that sensitization profiles vary between countries and even regions, and that the timing of symptom onset differs according to sensitization patterns.

Study Limitations

The limitations of our study include its single-center design and a relatively small number of patients. Additionally, because the number of monosensitized patients was low, nasal and ocular VAS scores could not be analyzed separately according to sensitization profiles. The patient group included seasonal cases, perennial cases, and perennial cases with seasonal exacerbations, and was therefore heterogeneous. Although this may be considered a limitation because it may affect the distribution of symptoms, it also provides insight into different AR types based on symptom timing. Nevertheless, the study is highly valuable as a prospective, real-life investigation evaluating VAS scores in children with AR according to the ARIA classification.

CONCLUSION

AR is a common condition that is often comorbid with other disorders and adversely affects quality of life. Our study is important because it evaluates symptoms in children with AR based on sensitization patterns and AR classifications and demonstrates that the phenotypic characteristics of AR significantly affect symptom severity.

ETHICS

Ethics Committee Approval: Ethical approval for the non-interventional study, planned in accordance with the Helsinki Declaration, was obtained from the Non-Interventional Ethics Committee of the İzmir City Hospital (approval no: 2025/390, date: 10.09.2025).

Informed Consent: Detailed information regarding the study was provided to all eligible patients and their parents, and written informed consent was obtained prior to enrollment.

FOOTNOTES

Authorship Contributions

Surgical and Medical Practices: E.Ş.Y., İ.T., İ.A.H., R.Y., İ.N.Ş., T.T., Concept: E.Ş.Y., T.T., Design: E.Ş.Y., T.T., Data Collection

or Processing: E.Ş.Y., İ.T., İ.A.H., R.Y., İ.N.Ş., Analysis or Interpretation: E.Ş.Y., İ.T., Literature Search: E.Ş.Y., Writing: E.Ş.Y., T.T.

Conflict of Interest: No conflict of interest was declared by the authors.

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