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Research Article

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Evaluation of Quality of Life in Children With Allergic Rhinitis

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Abstract Allergic rhinitis (AR), caused by IgE-mediated inflammation of the nasal mucosa due to allergens, affects 20-40% of Europe and the U.S. population, with varying prevalence in other regions. The study investigates the impact of allergic rhinitis (AR) on the quality of life (QOL) in school-aged children. It evaluates the effectiveness of the Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ) in assessing disease severity and treatment outcomes. It uses the ARIA classification to categorize rhinitis severity. By analyzing QOL scores before and after treatment, the study assesses how well the PRQLQ reflects changes in disease severity and improves understanding of AR's impact on children's daily lives. The study used a prospective, longitudinal design to evaluate the impact of allergic rhinitis on children's QOL before and after treatment. It included 120 children aged between 6-12 years, diagnosed with allergic rhinitis, and assessed using the Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ) at the start and six weeks after treatment. Data were analyzed for changes in QOL scores across different rhinitis severity groups (via ARIA classification), considering sociodemographic factors and treatment effects. Results showed significant improvements in QOL scores post-treatment across all rhinitis groups. The PRQLQ scores, including subscales for nasal symptoms, eye symptoms, practical issues, and activity limitations, decreased significantly after treatment, indicating improved QOL. The study found that more severe rhinitis led to lower QOL before treatment, but significant improvements were noted in all groups after treatment. The PRQLQ effectively measured these changes and highlighted the substantial impact of allergic rhinitis on school-aged children's daily lives, underscoring the importance of effective treatment in enhancing their quality of life.

Keywords Child health · quality of life · allergic rhinitis · treatment

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INTRODUCTION

Allergic rhinitis (AR) is a symptomatic condition resulting from IgE-mediated inflammation of the nasal mucosa membrane upon exposure to allergens (1). Symptoms such as postnasal drip, throat clearing and sniffling, palatal clik, itching, sneezing, and nasal congestion occur due to IgE-mediated mast cell degranulation (2). AR is one of the most common chronic diseases in children worldwide. Prevalence increases with age: 5% at age 3; 8.5% at ages 6–7 and 14.6% at ages 13–14 (3). Although significant geographic variations exist, studies have shown that the prevalence of self-reported allergic rhinitis symptoms in children is 18,12% while physician-diagnosed AR is 10,5% (3, 4). In our country, studies indicate an increasing trend in the AR prevalence. A recent study in the Central Black Sea region found that 3.1% of children had AR, showing a significant increase compared to 20 years ago (5). In Konya, the prevalence of AR was found to be 43.2%, higher than in previous years (6). Recent research highlights that AR is strongly associated with asthma (10-40% of AR patients have asthma), sleep disturbances, atopic dermatitis, and sinusitis (7, 8).

The Allergic Rhinitis and Its Impact on Asthma (ARIA) classification is a global guideline developed in collaboration with the World Health Organization (WHO) to standardize the diagnosis, classification, and treatment of allergic rhinitis (AR). The ARIA classification divides allergic rhinitis (AR) at frequency (intermittent or persistent) and severity (mild or moderate-severe). Intermittent AR occurs for less than four days per week or four consecutive weeks, whereas persistent AR lasts longer. Mild AR has no major impact on daily life despite moderate-severe AR causing severe symptoms such as significant nasal congestion or discomfort, sleep disturbances, and impairment in daily activities, school, or work performance (7).

The diagnosis relies on a detailed history, physical examination, and allergen-specific tests. Skin prick tests (SPT) and serum-specific immunoglobulin E measurements are fundamental diagnostic methods for identifying allergens. Serum total IgE testing is an alternative, especially in cases where SPT is not possible (such as a child has dermographism). Nasal eosinophilia and Basophil Activation Tests (BAT) have potential use in pediatric AR diagnosis, but data is still limited. Although treatment typically begins with environmental measures to avoid allergens, pharmacological agents such as intranasal corticosteroids (INCS) are often preferred for controlling moderate-severe symptoms as the first-line. Other treatment options include nasal irrigation, intranasal antihistamines, oral H1 antihistamines, intranasal anticholinergics, nasal decongestants, and leukotriene receptor antagonists (only in combination with INCS when needed), and allergen-specific immunotherapy (3, 8).

As allergic rhinitis was not life-threatening, research showed that many parents did not seek medical treatment or over-the-counter remedies. However, this condition could significantly affect children's cognitive and psychomotor functions, learning abilities, sleep, and participation in social activities, impairing their quality of life (9). Both ARIA and ICAR (International Consensus Statement on Allergy and Rhinology) emphasize the need for systematic QoL assessment in children with AR to monitor treatment effectiveness, guide management decisions, and improve patient-centered care (7, 8). To evaluate the quality of life in children with allergic rhinitis, Juniper et al. developed the Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ) in 1998, which was translated into Turkish by Hasan Yüksel et al. in 2009 (10, 11). In patients with both asthma and allergic rhinitis, general quality of life scales (e.g., PedsQL) or specific scales for both (such as CARATKids for children and RHINASTHMA-Adolescents for adolescents) could be used (12-14). Ecological momentary assessments (EMA) are a new method that depends on repeated measurements of daily symptoms to better reflect the severity of disease and QOL better (15). This study aimed to investigate the impact of allergic rhinitis on the quality of life of school-aged children before and after treatment and to assess the applicability of quality-of-life scales in determining disease severity and monitoring treatment.

METHODS

Our study was designed as a prospective, longitudinal, pre-post type. Sample size determination was performed using the G-power 3.1.9.2 software. The analysis indicated that 120 participants would be required with an effect size of 0.5 and 80% power. Ethical approval was obtained from the Bezmialem Vakıf University Clinical Research Ethics Committee. Written and verbal consent was obtained from all parents and verbal consent from the children.

The study was conducted with 120 volunteer children and their parents who were diagnosed with allergic rhinitis and met the inclusion criteria (see Table 1: Inclusion and Exclusion Criteria) at Bezmialem Vakıf University Faculty of Medicine Pediatric Allergy Clinic between December 2015 and January 2016. Patients were classified into four groups based on the ARIA classification according to symptom frequency and severity (7). The routine treatments (INCS, oral antihistaminic (OAH), INCS and OAH and LTRA) were started due to disease severity, as recommended in the ARIA guidelines.

Table 1. Inclusion and exclusion criteria

Inclusion Criteria	1. Providing informed consent to participate in the study 2. Aged 6 to 12 years. 3. Clinical symptoms consistent with allergic rhinitis with at least one positive skin prick test result for an allergen. 4. Newly diagnosed or previously diagnosed but untreated for at least 2 months. 5. Patients who were at the beginning of routine treatment (INCS, OAH and or LTRA)
Exclusion Criteria	1. Presence of any chronic disease other than mild persistent asthma or mild intermittent asthma 2. Patients receiving specific immunotherapy and any treatments other than INCS, OAH, or LTRAs.

Descriptive data about the patients, including parents' socioeconomic status (age, occupation, education level, monthly income), number of siblings, household size, type of home heating, smoking exposure, presence of pets, and family history of atopy, were collected through a face-to-face questionnaire administered by the responsible researcher. The socioeconomic status of the families was determined by calculating the weighted average of the scores from the patient information form, with scores below 1 standard deviation considered low, between 1 and +1 standard deviation considered medium, and above +1 standard deviation considered high (16).

The skin prick test results, serum total IgE levels, and serum eosinophil percentages of each participant were retrieved from patient records at the Pediatric Allergy Outpatient Clinic, Bezmialem Faculty of Medicine. Skin prick tests had been performed on the forearm using major allergens, including grass, tree, weed pollens, mold, cat, dog, cockroach, and house dust mites (Dermatophagoides pteronyssinus, Dermatophagoides farinae) (Allergopharma®, Germany). Egg yolk, egg white, and chicken meat had also been tested with skin prick tests in some patients who were suspected of having food allergies (Allergopharma®, Germany). Serum total IgE levels were measured in all children using the chemiluminescent enzyme immunoassay method with the Immulite 2000 analyzer (DPC, Los Angeles, CA).

The PRQLQ was used to assess the QOL scores of the participants before and after the routine treatment. The questionnaire consists of 23 questions about the patient's condition over the past week. Four questions address nasal symptoms, four address eye symptoms, five address practical issues, six address other problems, and four address activity limitations (11). PRQLQ responses range from 0 to 6, with higher total scores indicating worse QOL. The PRQLQ was administered to children face-to-face by the researcher at the start of treatment and by phone at the 6th week.

Categorical data are presented as n and %, while continuous data are presented as mean ± standard deviation or median (range) depending on the distribution characteristics. Continuous data distributions were tested using the Kolmogorov-Smirnov test. Comparisons of non-parametric data were made using the Mann-Whitney U test, Wilcoxon signed-rank test, and Kruskal-Wallis test, while parametric data were compared using the dependent samples t-test, independent samples t-test, and one-way ANOVA. Post-hoc Tukey tests were performed for significant findings in multiple comparisons. Analyses were conducted using SPSS 20. Categorical data were evaluated using the chi-square test, and a p value of 0.05 was accepted as statistically significant.

RESULTS

The study was completed with 120 patients (45.8% female, 54.2% male), with a median age of 9 years (min-max: 6-12 years). The sociodemographic and clinical characteristics are shown in (Table 2). According to the skin prick test results, 83.9% of the patients were sensitive to dust mite allergens, while 15.9% were sensitive to multiple allergens. The multi-allergen group had sensitivities to dust mites and other allergens such as pollen (including cereal and grass mix), mold, cat dander, dog dander, egg white, egg yolk, and chicken meat. The rate of children with multi-allergen sensitization was similar in the mild (12/60; 20%) and moderate/severe AR (9/60; 15%) groups. The children with allergic rhinitis (AR) who had comorbid asthma (15/60; 25%) compared with those with AR only (6/60; 10%) had more frequent multi-allergen sensitizations ($p = 0.031$, χ^2 test). The median serum total IgE was 176,42 (min-max: 1,00-3000,00) IU/mL in children. There was no statistically significant difference between the serum total IgE levels of the mild-intermittent AR, mild persistent AR, moderate/severe intermittent AR or moderate/severe persistent AR groups.

As participants were classified into four groups via the ARIA classification, each group had 30 children. The groups were intermittent mild rhinitis, intermittent moderate-severe rhinitis, persistent mild rhinitis, and persistent moderate-severe rhinitis, totaling 120 patients. The PRQLQ was applied and repeated after six weeks of treatment. Significant reductions were observed in both the total and subscale scores after treatment (Figure 1: Pre-treatment and Post-treatment Values of Subscale Scores). The total scale scores by rhinitis classification showed that patients with intermittent mild rhinitis had lower scores than those in other rhinitis groups both before and after treatment. Significant reductions

Table 2. Sociodemographic and clinical characteristics of the children

Sociodemographic characteristics	**n=120**	**%**
Gender		
Female	55	45.8
Male	65	54.2
Age (years)[†]	**9.0**	**(6.0-12.0)**
Socioeconomic status		
Low	25	20.8
Medium	81	67.5
High	14	11.7
Family history of atopy		
None	54	45.0
Present	66	55.0
Exposure to smoking		
None	47	39.2
Present	73	60.8
Presence of pets		
None	103	85.8
Present	17	14.2
Diagnosis		
Mild intermittent rhinitis (MIR)		
· *MIR with asthma (n=15)*	30	25
Moderate-severe intermittent rhinitis (MSIR)		
· *MSIR with asthma (n=17)*	30	25
Mild persistent rhinitis (MPR)		
· *MPR with asthma (n=15)*	30	25
Moderate-severe persistent rhinitis (MSPR)		
· *MSPR with asthma (n=13)*	30	25
Skin prick test (SPT)		
Sensitive to **dust mite allergens only** (D. Pteronyssinus (d1) and D. Farinae (d2))	99	83.9
Sensitive to **multiple allergens**		
· **Aero-allergens** (n=19)		
d1 and d2 and pollen mix and cereal grains (n=8)		
d1 and d2 and cat dander with/without dog dander (n=6)		
d1 and d2 and cat dander and pollen mix with/without cereal grains, tree and mold 1 (n=2)		
(d1 and d2 and mold1, pollen mix, cereal/grains (n=1)		
d2 and mold 1 and mold 2 (n=1)		
Cat dander and dog dander (n=1)		
· **aero- and food allergens**		
(d2 and mold 1 and mold 2 and chicken meat) (n=1)		
· **food allergens**		
(egg white and egg yolk, and chicken meat (n=1))	21	16.1
Serum total IgE[†] **(IU/mL)**	176,40	(1.0-3000)
Serum eosinophils %		
<4%	47	39.2
≥4%	73	60.8

Median, minimum, and maximum values are shown for the continuous variables.

in the total scale scores were observed in all rhinitis groups after treatment (Figure 2).

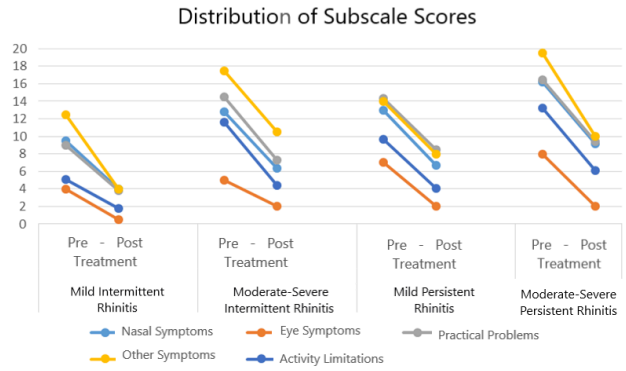

Figure 1. Pre- and post-treatment Values of Subscale Scores (p < 0.001 for all).

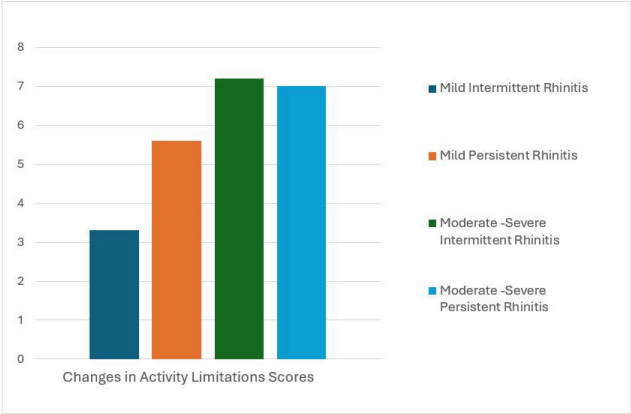

Figure 2. Changes in Activity Limitations Scores Following Rhinitis Treatment (p=0.001).

Table 3. Distribution of Changes in Scale Scores According to Rhinitis Diagnosis Categories and Their Association with Asthma

Condition	Mild Rhinitis	Mild Rhinitis + Asthma	Moderate-Severe Rhinitis	Moderate-Severe Rhinitis + Asthma	p value[1]
N-difference	6.3 (4.1)	5.5 (3.6)	6.9 (3.7)	6.5 (5.2)	0.592
E-difference [2]	3.0 (-4.0 to 12.0)	3.0 (-2.0 to 14.0)	4.0 (-2.0 to 17.0)	3.5 (-4.0 to 11.0)	0.782
P-difference	5.7 (3.8)	5.4 (3.9)	7.1 (4.3)	7.1 (5.2)	0.253
O-difference [2]	5.5 (-4.0 to 18.0)	7.0 (0.0 to 18.0)	10.0 (-5.0 to 26.0)	8.0 (-17.0 to 16.0)	0.123
A-difference	4.5 (4.6)	4.5 (4.2)	6.8 (3.8)	7.5 (4.4)	**0.010**
Total-difference	26.0 (13.7)	27.1 (12.1)	35.8 (16.6)	32.3 (18.3)	0.051

The values in parentheses represent the standard deviations or ranges where applicable. [1]*One-way ANOVA Test,* [2]Median (min-max) values and the p-value from the Kruskal-Wallis test are shown for non-parametric data.

Subscale scores for nasal and eye symptoms, other issues, practical problems, and activity limitations were analyzed by rhinitis classification. Nasal symptom scores were higher in patients with persistent moderate-severe rhinitis compared with other rhinitis groups both before and after treatment. Significant reductions in nasal symptom scores were observed in all rhinitis groups after treatment (pre and post-treatment p<0.001, all group comparisons pre-post p<0.001). There were no significant differences in the eye symptom subscale scores before and after treatment among the rhinitis classifications. Significant reductions in eye symptom scores were observed in all groups after treatment (pre and post-treatment p>0.05, all group comparisons pre-post p<0.001). Practical problems, other issues, and activity limitations subscale scores were lower in patients with intermittent mild rhinitis compared with the other groups both before and after treatment. Significant reductions in scores for these subscales were observed in all rhinitis groups after treatment (pre and post-treatment p<0.001, all group comparisons pre-post p<0.001) (Figure 2).

In the activity limitation subscale, significant changes were observed in the moderate-severe rhinitis group compared with the mild rhinitis groups before and after treatment (pre-treatment p<0.05). This subscale also showed significant improvements after treatment in all rhinitis groups (pre and post-treatment p<0.001, all group comparisons pre-post p<0.001).

Sociodemographic factors such as gender, socioeconomic status, number of siblings, smoking exposure, and family history of atopy did not significantly affect the PRQLQ scores. Only the subscale score for nasal symptoms was higher (p=0.027) and the score for practical problems was slightly higher in children from families with a higher socioeconomic status (p=0.058).

DISCUSSION

This study evaluated the impact of allergic rhinitis (AR) on the quality of life (QoL) of school-aged children before and after treatment while assessing the applicability of QoL scales in determining disease severity. Our findings confirm that AR significantly impairs children's daily functioning, with notable improvements following appropriate treatment, as reflected in reductions in the PRQLQ scores. The study also reinforces the reliability of the ARIA classification in assessing disease severity and its impact on QoL.

Consistent with previous studies, our results demonstrate that moderate-severe persistent AR is associated with the most significant QoL impairments(17, 18). Research from Japan and Thailand also supports the role of nasal congestion and polysensitization, particularly to house dust mites, as

major contributors to poor QoL (19, 20). The activity limitation subscale of the PRQLQ was particularly relevant for children with moderate-severe AR, suggesting that rhinitis significantly disrupts daily life beyond physical symptoms. This aligns with prior research indicating that AR affects cognitive performance, sleep quality, and social interactions (9, 14, 20). Post-treatment improvements across all PRQLQ subscales reinforce the importance of early and effective intervention in mitigating these impairments.

Additionally, we found that children with asthma comorbidity were more likely to have multi-allergen sensitization, which is consistent with studies indicating that polysensitization is a key factor in AR severity and its association with asthma. A population-based study found that individuals with AR and asthma had significantly more severe symptoms, increased conjunctivitis, and higher eosinophil counts than those with AR alone (18). Similarly, a Korean birth cohort study showed that moderate-severe AR was strongly associated with bronchial hyperresponsiveness and higher risks of asthma, reinforcing the link between multi-allergen sensitization and respiratory comorbidities (21). Our study reinforces these findings, suggesting that polysensitization may serve as a predictor of AR severity and potential progression to asthma. This underscores the need for early identification and targeted interventions in children with AR to prevent respiratory complications.

While significant reductions were observed across all PRQLQ subscales, ocular symptoms showed the least variation between rhinitis classifications. This suggests that while nasal symptoms and general discomfort improve substantially with treatment, eye symptoms may require additional targeted therapies, such as antihistamine eye drops or allergen avoidance strategies. This finding aligns with reports that ocular symptoms in AR are often underestimated and undertreated, despite their significant contribution to the disease burden (7, 8).

Unlike previous research suggesting that socioeconomic status and environmental exposures (e.g., passive smoking, household crowding) influence AR severity and QoL, our findings indicate minimal sociodemographic effects on PRQLQ scores (8). The only notable differences were in the nasal symptoms and practical problems subscale scores in children from higher socioeconomic backgrounds, potentially due to increased parental awareness and expectations regarding symptom management. This discrepancy underscores the need for further studies to assess the complex interplay between socioeconomic factors and disease perception.

A major study strength is its prospective, longitudinal design, which allowed for the direct assessment of treatment-related changes in QoL. Additionally, using the PRQLQ provided a validated measure of the disease burden specific to pediatric AR. However, several limitations should be considered. The six-week follow-up may not fully capture the long-term treatment effects or seasonal variations in allergen exposure. Longer studies with control groups are needed to assess the sustained treatment benefits and alternative interventions. PRQLQ, while validated, does not allow for real-time symptom monitoring. In younger children (six to nine years of age), assessments relied on direct administration, whereas digital health tools often involve parental input, which may influence symptom reporting consistency (7, 8).

Another limitation is the lack of information on specific pet types in households, which could affect allergen exposure and symptom severity. Previous research has indicated conflicting results regarding pet ownership and AR risk. While some studies suggest that early exposure to cats and dogs may reduce the risk of AR development, others report an increased risk associated with pet ownership (8). The influence of pet type, timing, and duration of exposure on AR development remains an important area for future research.

In conclusion, our study demonstrates that AR significantly impairs the QoL of school-aged children, particularly those with persistent and moderate-severe disease. Effective treatment results in substantial improvements across multiple QoL domains, reinforcing the importance of adherence to guideline-recommended therapies. Continued efforts to integrate QoL assessments into clinical practice will enhance patient-centered management and improve health outcomes in pediatric AR. Future studies should explore long-term treatment strategies and digital symptom tracking in improving QoL and reducing AR-related morbidity.

Ethics Committee Approval	Ethical approval was obtained from the Bezmialem Vakıf University Clinical Research Ethics Committee. (71306642-050.01.04).
Informed Consent	Written and verbal consent was obtained from all parents.
Peer Review	Externally peer-reviewed.
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REFERENCES

1 Bousquet J, van Cauwenberge P, Khaltaev N. Allergic Rhinitis and Its Impact on Asthma. Journal of Allergy and Clinical Immunology. 2001;108(5):S147-S334.

2 Skoner DP. Allergic rhinitis: definition, epidemiology, pathophysiology, detection, and diagnosis. J Allergy Clin Immunol. 2001;108(1 Suppl):S2-8.

3 Cheng M, Dai Q, Liu Z, Wang Y, Zhou C. New progress in pediatric allergic rhinitis. Front Immunol. 2024;15:1452410.

4 Licari A, Magri P, De Silvestri A, Giannetti A, Indolfi C, Mori F et al. Epidemiology of Allergic Rhinitis in Children: A Systematic Review and Meta-Analysis. J Allergy Clin Immunol Pract. 2023;11(8):2547-56.

5 Karadag SIK, Sariaydin B, Sariaydin A, Sancak R. Evolving Trends in Pediatric Allergic Diseases: A Cross-Sectional Study Over 20 Years in the Central Black Sea Region of Turkey. Pediatr Allergy Immunol Pulmonol. 2024;37(3):74-80.

6 Yazar B, Meydanlioglu A. The prevalence and associated factors of asthma, allergic rhinitis, and eczema in Turkish children and adolescents. Pediatr Pulmonol. 2022;57:2491-501.

7 Bousquet J, Schunemann HJ, Sousa-Pinto B, Zuberbier T, Togias A, Samolinski B et al. Concepts for the Development of Person-Centered, Digitally Enabled, Artificial Intelligence-Assisted ARIA Care Pathways (ARIA 2024). J Allergy Clin Immunol Pract. 2024;12(10):2648-68 e2.

8 Wise SK, Damask C, Roland LT, Ebert C, Levy JM, Lin S et al. International consensus statement on allergy and rhinology: Allergic rhinitis-2023. Int Forum Allergy Rhinol. 2023;13(4):293-859.

9 Blaiss MS, Allergic Rhinitis in Schoolchildren Consensus G. Allergic rhinitis and impairment issues in schoolchildren: a consensus report. Curr Med Res Opin. 2004;20(12):1937-52.

10 Juniper EF, Howland WC, Roberts NB, Thompson AK, King DR. Measuring the quality of life in children with rhinoconjunctivitis. J Allergy Clin Immunol. 1998;101(2 Pt 1):163-70.

11 Yuksel H, Yilmaz O, Sogut A, Eser E. Validation and reliability study of the Turkish version of the Pediatric Rhinitis Quality of Life Questionnaire. Turk J Pediatr. 2009;51(4):361-6.

12 La Grutta S, Landi M, Braido F, Montalbano L, Ferrante G, Malizia V et al. RHINASTHMA-Adolescents: a new quality of life tool for patients with respiratory allergy. Pediatr Allergy Immunol. 2014;25(5):450-5.

13 Linhares DV, da Fonseca JA, Borrego LM, Matos A, Pereira AM, Sa-Sousa A et al. Validation of control of allergic rhinitis and asthma test for children (CARATKids)–a prospective multicenter study. Pediatr Allergy Immunol. 2014;25(2):173-9.

14 Sritipsukho P, Satdhabudha A, Nanthapisal S. Effect of allergic rhinitis and asthma on the quality of life in young Thai adolescents. Asian Pac J Allergy Immunol. 2015;33(3):222-6.

15 Schusteff RA, Chervinko MA, Nyenhuis SM, Lee VS. Ecological momentary assessment of outcomes in allergic rhinitis and chronic rhinosinusitis: A review. Int Forum Allergy Rhinol. 2022;12:1282-90.

16 Bacanlı H. Sosyal İlişkilerde Kendini Ayarlamanın Psikolojisi. İstanbul: MEB Yayınları; 1997.

17 Zeng Y, Lin T, Xie W, Gao S, Zeng Q, Luo X et al. Characteristics of Pediatric Allergic Rhinitis With Different Disease Severity. Mediators of Inflammation. 2025;2025(1):5553039.

18 Savouré M, Bousquet J, Leynaert B, Ribet C, Goldberg M, Zins M et al. Asthma is associated with increased severity and duration of rhinitis: A study with the Allergic Rhinitis and its Impact on Asthma classes in the Constances cohort. Clinical and Translational Allergy. 2023;13:e12316.

19 Watanabe D, Otawa S, Kushima M, Yui H, Shinohara R, Yamagata Z et al. Association between allergen-specific immunoglobulin E sensitization, allergic rhinitis symptoms, and quality of life in school-aged children. Scientific Reports. 2024;14(1):31940.

20 Sritipsukho P, Chaiyakulsil C, Junsawat P. Quality of life of elementary school students with sleep-disordered breathing and allergic rhinitis: A population-based study in Thailand. PLOS ONE. 2024;19(9):e0310331.

21 Jung S, Yoon J, Cho H-j, Kim Y-H, Suh DI, Yang S-I, et al. Risk factors and comorbidities of the allergic rhinitis phenotype in children according to ARIA classification. Journal of Allergy and Clinical Immunology. 2018;141(2):AB106.