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Lower Urinary Tract Symptoms in Adolescents with Allergic Rhinitis: The Role of Disease Duration and Severity

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What's known on the subject? and What does the study add?

Previous studies have reported associations between allergic diseases and pediatric lower urinary tract symptoms, mainly by assessing allergic disease as present or absent. This study finds that among adolescents with allergic rhinitis, urinary symptom burden is more closely associated with the duration and severity of allergic disease.

Abstract

Objective: Allergic respiratory diseases may be associated with lower urinary tract symptoms (LUTS), but whether the allergic disease burden is related to the severity of urinary symptoms remains unclear. This study aimed to evaluate LUTS in adolescents with allergic rhinitis (AR) and to test the hypothesis that allergic disease burden is associated with higher Dysfunctional Voiding and Incontinence Symptom Score (DVISS).

Materials and Methods: This single-center, cross-sectional observational study included children aged 12-18 years with physician-diagnosed AR. AR severity was categorized as mild or moderate-to-severe according to the Allergic Rhinitis and its Impact on Asthma classification. Disease duration, visual analogue scale score, medication score, laboratory markers of atopy, aeroallergen sensitization profile, and DVISS were recorded. Group comparisons, Spearman correlation analysis, and multivariable linear regression analysis were performed.

Results: Of the 111 adolescents, 55 had AR alone and 56 had AR with asthma. The total DVISS score did not differ significantly between the groups. Total DVISS score was weakly positively correlated with disease duration, disease severity, and visual analogue scale score. In multivariable analysis, longer disease duration and greater disease severity were weak-to-modest factors associated with higher DVISS scores after adjustment for age, sex, and medication score; however, the explanatory power of the model was limited. Storage symptoms, particularly daytime urinary frequency, nocturia, and urgency, showed more consistent associations with allergic disease burden than voiding symptoms.

Conclusion: In adolescents with AR, longer disease duration and greater disease severity were weak-to-modest factors associated with a higher burden of LUTS. These findings support considering LUTS in adolescents with chronic or severe allergic respiratory disease; however, further prospective studies are required before routine clinical recommendations can be made.

Keywords: Allergic rhinitis, asthma, adolescent, lower urinary tract symptoms, dysfunctional voiding

Introduction

Allergic rhinitis (AR) and asthma are among the most common chronic inflammatory diseases in childhood and adolescence, affecting quality of life, school performance, and healthcare utilization worldwide (1). These conditions frequently coexist as manifestations of a unified airway disease and share common immunological mechanisms characterized by type 2 inflammation, eosinophilic infiltration, mast cell activation, and increased production of inflammatory mediators. Owing to

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their chronic nature, both diseases may exert systemic effects extending beyond the respiratory tract (2,3).

Accumulating evidence suggests that allergic diseases may be associated with lower urinary tract function and urinary symptom burden in children (4,5). Experimental and clinical studies have demonstrated that mast cell activation, eosinophilic inflammation, neuroimmune interactions, and increased sensory nerve excitability may contribute to bladder hypersensitivity and lower urinary tract symptoms (LUTS) (6,7). These mechanisms have been proposed to explain storage symptoms such as increased daytime urinary frequency, urgency, nocturia, and urinary incontinence in selected pediatric populations. However, the underlying mechanisms remain incompletely understood, and the available evidence is limited.

Previous studies investigating the relationship between allergic diseases and pediatric LUTS have primarily focused on the presence of allergic conditions (8,9). In contrast, little attention has been paid to whether the clinical burden of allergic disease—including disease duration, symptom severity, treatment intensity, and laboratory markers of atopy—is associated with urinary symptom severity. Furthermore, comparative data between children with AR alone and those with concomitant asthma remain scarce.

The present study aimed to evaluate LUTS in adolescents with AR, with or without concomitant asthma, using the Dysfunctional Voiding and Incontinence Symptom Score (DVISS). In addition to comparing urinary symptoms between disease phenotypes, we investigated the relationships between urinary symptom severity and clinical characteristics of allergic disease, including disease duration, disease severity, visual analogue scale (VAS) score, medication score, laboratory parameters, and aeroallergen sensitization profile. We hypothesized that the clinical burden of allergic respiratory disease, rather than disease phenotype alone, would be associated with higher urinary symptom burden within this allergic population.

Materials and Methods

This study was reported in accordance with the STROBE guidelines for cross-sectional studies.

Study Design and Participants

This single-center, cross-sectional, observational study was conducted at the Pediatric Allergy and Immunology outpatient clinic of University of Health Sciences Türkiye, Dr. Behçet Uz Pediatric Diseases and Surgery Training and Research Hospital.The study included adolescents aged 12-18 years with a diagnosis of AR, with or without concomitant asthma.

Patients were eligible if they had a physician-confirmed diagnosis of AR, with or without concomitant asthma, had attended a routine outpatient visit, and had complete clinical and questionnaire data available for analysis. Patients with known neurological disease, neurogenic bladder, structural urinary tract abnormalities, active urinary tract infection, previous urological surgery, chronic kidney disease, use of medications that could directly affect voiding function, or incomplete questionnaire data were excluded. After applying the inclusion and exclusion criteria, 111 adolescents (aged 12-18 years) with allergic respiratory disease were included in the final analysis. All included patients had complete clinical, laboratory, and questionnaire data; therefore, no patient was excluded because of missing data.

A sample size calculation was performed based on the primary hypothesis that allergic disease burden would be associated with the total DVISS/*İşeme Bozuklukları Semptom Skoru* (İBSS) score. Because no directly comparable previous study was available, a weak-to-moderate expected correlation coefficient of 0.30 was considered clinically relevant. Using a two-tailed correlation model with an alpha error probability of 0.05 and 80% power, the minimum required sample size was calculated to be 84 participants. Therefore, the final sample size of 111 adolescents was considered sufficient for the primary correlation analysis.

The study protocol was approved by the University of Health Sciences Türkiye, Dr. Behçet Uz Pediatric Disease and Surgery Training and Research Hospital Non-Interventional Research Ethics Committee (approval number: GOA-386, date: 04.06.2026). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from the parents or legal guardians of all participants, and assent was obtained from adolescents when appropriate.

All data were collected using a standardized case report form. The recorded variables included demographic characteristics, type of allergic respiratory disease, disease duration, clinical severity, medication use, asthma treatment status, VAS score, laboratory parameters, aeroallergen sensitization profile, and LUTS scores.

Assessment of Allergic Respiratory Diseases

AR was diagnosed by a pediatric allergist based on compatible nasal symptoms, including rhinorrhea, nasal obstruction, sneezing, and/or nasal itching, together with clinical evaluation and evidence of allergic sensitization when available, in accordance with the Allergic Rhinitis and its Impact on Asthma (ARIA) approach (10). AR severity was classified as mild or moderate-to-severe according to the ARIA classification, based on symptom burden and its impact on daily activities, sleep, school performance, and quality of life. Disease duration was recorded separately as the number of years since diagnosis and

did not represent the ARIA intermittent/persistent classification. Patients were classified as having AR alone or as having AR with concomitant asthma.

Asthma was diagnosed according to current Global Initiative for Asthma (GINA)-based clinical principles, using recurrent respiratory symptoms, physician assessment, treatment history, and objective lung function findings when available (11). Current asthma treatment was recorded as a binary variable. Disease duration was recorded in years.

Medication Score

Medication use was evaluated using a modified, study-defined medication score (MS), structured on the medication-use component of the Combined Symptom and Medication Score framework proposed by the European Academy of Allergy and Clinical Immunology (EAACI) (12). The MS was scored from 0 to 3 according to the highest medication category recorded for each patient: 0, no medication; 1, oral and/or topical non-sedating H1-antihistamines; 2, intranasal corticosteroids with or without H1-antihistamines; and 3, leukotriene receptor antagonist therapy, specifically montelukast, with or without other medications. Since none of the patients in this cohort received oral corticosteroids during the study period, montelukast use was categorized as the highest medication step in this study-defined scoring approach. Scores were not cumulative; when more than one medication category was used, only the highest applicable score was recorded.

VAS Assessment

The severity of allergic respiratory symptoms was assessed using a 10 cm VAS, a simple quantitative tool commonly used to evaluate AR symptom burden (13). Patients were asked to rate their overall allergic respiratory symptom severity from 0, indicating no symptoms, to 10, indicating the most severe symptoms imaginable. Higher VAS scores reflected greater perceived symptom burden.

Assessment of LUTS

LUTS were evaluated using the DVISS, recorded in Turkish as the "İBSS" (14). The questionnaire assessed urinary frequency, nocturia/enuresis, urgency, urinary incontinence, intermittent voiding, straining or hesitancy during voiding, post-void symptoms, holding maneuvers, constipation, and quality of life. Item scores were summed to obtain the total DVISS score, with higher scores indicating more severe voiding symptoms (15,16). In addition to the total score, individual symptom components were recorded separately for analysis.

Laboratory Parameters and Allergic Sensitization

Routine laboratory values obtained during clinical follow-up were extracted from patient records. These included eosinophil percentage, absolute eosinophil count, total serum immunoglobulin E (IgE) level, neutrophil count, lymphocyte count, and platelet count.

Aeroallergen sensitization was evaluated using available skin-prick test results and/or serum-specific IgE results obtained during routine allergy assessment. Sensitization to house dust mite, grass pollen, olive pollen, animal dander, and mold allergens was recorded. Skin prick test results were interpreted according to standard procedures, and sensitization was considered present when a clinically relevant positive response was documented (17). Aeroallergen sensitization was further categorized according to allergen source. Sensitization to house dust mite, animal dander, and mold allergens was classified as indoor allergen sensitization, whereas sensitization to grass pollen and olive pollen was classified as outdoor allergen sensitization. Patients sensitized to both indoor and outdoor allergens were considered to have mixed sensitization. This classification was used for exploratory comparisons of LUTS scores according to aeroallergen sensitization profile.

Statistical Analysis

Statistical analyses were performed using appropriate statistical software. Continuous variables were assessed for normality by visual inspection and by statistical normality tests. Normally distributed variables were presented as mean ± standard deviation, whereas non-normally distributed variables were presented as median and interquartile range or minimum-maximum values, as appropriate. Categorical variables were summarized as numbers and percentages.

Comparisons between groups, such as AR alone versus AR with asthma, were performed using the Mann-Whitney U test for continuous variables according to the distribution of the data. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. Correlations among clinical scores, laboratory parameters, disease duration, and medication, VAS, and DVISS scores were evaluated using Spearman correlation analysis. Confidence intervals (CIs) for Spearman correlation coefficients were calculated using Fisher's z transformation. Multivariable regression analysis, adjusted for potential confounders such as age and sex, was planned to identify independent factors associated with LUTS severity. A p-value <0.05 was considered statistically significant.

Results

A total of 111 adolescents with allergic respiratory disease were included in the study. Of these, 55 (49.5%) had AR alone and 56 (50.5%) had concomitant AR and asthma. The mean age of the study population was 14.93±2.05 years, and 78 participants (70.3%) were male.

Table 1. Comparison of demographic, allergic disease-related, and lower urinary tract symptom characteristics between the groups					
		AR	AR + asthma	p-value	Effect sizes
Age, years, median (IQR)		16 (14-17)	14 (13-16.75)	0.006$^{\Sigma}$	r=0.26
Sex	Boy	33 (60%)	45 (80.4%)	0.019$^{\alpha}$	V=0.22
	Girl	22 (40%)	11 (19.6%)		
Disease duration, years, median (IQR)		3 (2-5)	7 (2.25-9)	<0.001$^{\Sigma}$	r=0.35
Disease severity	Mild	18 (32.7%)	18 (32.1%)	0.948$^{\alpha}$	
	Moderate-to-severe	37 (67.3%)	38 (67.9%)		
Medication score	0	4	4	0.505$^{\beta}$	
	1	9	8		
	2	23	17		
	3	19	27		
VAS score, median (IQR)		5 (4-6)	5 (3.25-6)	0.872$^{\Sigma}$	
Daytime urinary frequency, median (IQR)		5 (4-7)	5 (4-8)	0.266$^{\Sigma}$	
Nocturia	Absent	42 (76.4%)	46 (82.1%)	0.453$^{\alpha}$	
	Present	13 (23.6%)	10 (17.9%)		
Urgency	Absent	42 (76.4%)	43 (76.8%)	0.958$^{\alpha}$	
	Present	13 (23.6%)	13 (23.2%)		
Urinary incontinence	Absent	54 (98.2%)	50 (89.3%)	0.113$^{\beta}$	
	Present	1 (1.8%)	6 (10.7%)		
Interrupted urinary stream	Absent	50 (90.9%)	51 (91.1%)	0.976$^{\beta}$	
	Present	5 (9.1%)	5 (8.9%)		
Hesitancy/straining	Absent	52 (94.5%)	54 (96.4%)	0.679$^{\beta}$	
	Present	3 (5.5%)	2 (3.6%)		
Sensation of incomplete bladder emptying	Absent	46 (83.6%)	42 (75%)	0.262$^{\alpha}$	
	Present	9 (16.4%)	14 (25%)		
Constipation	Absent	49 (89.1%)	51 (91.1%)	0.727$^{\alpha}$	
	Present	6 (10.9%)	5 (8.9%)		
Total DVISS/IBSS score, median (IQR)		0 (0-2)	1 (0-2)	0.346$^{\Sigma}$	
DVISS/IBSS QoL item	No effect	48 (87.3%)	47 (83.9%)	0.606$^{\beta}$	
	Mild effect	6 (10.9%)	6 (10.7%)		
	Moderate effect	1 (1.8%)	3 (5.4%)		
	Severe effect	0 (0%)	0 (0%)		

Effect sizes were reported as r for Mann-Whitney U tests and Cramér's V (V) for categorical comparisons
AR: Allergic rhinitis, DVISS: Dysfunctional Voiding and Incontinence Symptom Score, İBSS: *İşeme Bozuklukları Semptom Skoru*, VAS: Visual analogue scale, IQR: Interquartile range, $^{\Sigma}$: Mann-Whitney U test, $^{\alpha}$: Chi-square test, $^{\beta}$: Fisher's exact test

The comparison of demographic characteristics, clinical features, and LUTS between the study groups is presented in Table 1. Patients with concomitant asthma were significantly younger than those with AR alone (p=0.006), and a significantly higher proportion of males was observed in the AR plus asthma group (p=0.019). Disease duration was also significantly longer in patients with concomitant asthma (p<0.001). However, disease severity, medication score, and VAS score were comparable between the groups (p>0.05).

No significant differences were observed between the AR and AR plus asthma groups regarding daytime urinary frequency, nocturia, urgency, urinary incontinence, interrupted urinary stream, hesitancy, sensation of incomplete bladder emptying, total DVISS score, or quality-of-life item (p>0.05). Likewise, separate analyses of each DVISS item demonstrated no statistically significant differences between the two groups. Urinary incontinence was numerically more frequent in the AR plus asthma group than in the AR group; however, this difference did not reach statistical significance. Given the small number of incontinence events, this comparison should be interpreted cautiously.

Correlation analysis demonstrated statistically significant positive correlations between total DVISS score and disease severity (ρ=0.229, 95% CI: 0.045-0.398, p=0.016), disease

duration (ρ=0.293, 95% CI: 0.113-0.455, p=0.002), and VAS score (ρ=0.247, 95% CI: 0.064-0.414, p=0.009). In contrast, medication score, eosinophil percentage, absolute eosinophil count, total serum IgE level, and aeroallergen sensitization profiles were not significantly correlated with total DVISS score (p>0.05).

Multivariable linear regression analysis identified disease duration (B=0.135, 95% CI: 0.010-0.259, β=0.196, p=0.034) and disease severity (B=1.012, 95% CI: 0.006-2.017, β=0.190, p=0.049) as weak-to-modest independent factors associated with higher DVISS scores after adjustment for age, sex, and MS. Age, sex, and MS were not independently associated with the DVISS score. Although VAS score was significantly correlated with total DVISS score, it was not included in the final multivariable model because it reflects subjective allergic symptom burden and is closely related to disease severity; including both variables in the same model could have increased collinearity and overfitting given the modest sample size. For transparency, constipation was reported as an individual DVISS component in Table 1. However, it was not included as an independent covariate in the multivariable regression model because it is already part of the total DVISS score; including it as a predictor of total DVISS would have resulted in circular adjustment. The overall regression model was statistically significant but explained a limited proportion of the variance in DVISS scores (R^2=0.135, adjusted R^2=0.094, p=0.009).

Using the previously suggested DVISS/IBSS threshold for clinically significant voiding dysfunction (≥9), only 3 patients (2.7%) exceeded this cut-off in the overall cohort. Clinically significant DVISS/IBSS scores were observed in 2 patients (3.6%) in the AR group and in 1 patient (1.8%) in the AR plus asthma group; there was no significant difference between groups (p=0.618).

Correlation analyses of individual LUTS are summarized in Table 2. Among storage symptoms, disease duration was positively correlated with daytime urinary frequency (ρ=0.245, 95% CI: 0.061-0.413, p=0.010) and nocturia (ρ=0.198, 95% CI: 0.012-0.371, p=0.037), whereas disease severity was positively correlated with urgency (ρ=0.247, 95% CI: 0.064-0.414, p=0.009), nocturia (ρ=0.212, 95% CI: 0.027-0.383, p=0.026), and daytime urinary frequency (ρ=0.186, 95% CI: 0.000-0.360, p=0.049). No significant correlations were identified between urinary incontinence and either disease duration or disease severity. Regarding voiding symptoms, disease duration showed a weak but statistically significant positive correlation with the sensation of incomplete bladder emptying (ρ=0.187, 95% CI: 0.001-0.361, p=0.049), whereas no significant correlations were observed with interrupted urinary stream or hesitancy. Disease severity was not significantly correlated with any voiding symptom, including interrupted urinary stream, hesitancy, or sensation of incomplete bladder emptying.

In the exploratory analysis, stratified by aeroallergen sensitization profile and performed without correction for multiple comparisons, children sensitized to outdoor allergens had higher total DVISS scores than those sensitized to indoor allergens (p=0.039). Among individual urinary symptoms, urgency was more frequent in the outdoor-sensitization group (p=0.031), whereas no significant differences were observed for the other storage or voiding symptoms. These exploratory findings should be interpreted cautiously.

Discussion

The present study investigated the relationship between allergic respiratory diseases and LUTS in adolescents with AR, with or without concomitant asthma. Although the coexistence of asthma did not result in significantly higher LUTS scores than those for AR alone, several clinically relevant findings emerged. First, disease duration, disease severity, and VAS score were positively correlated with overall symptom severity. Second, disease duration and disease severity remained independently associated with higher DVISS scores in multivariable analysis. Storage symptoms, particularly daytime urinary frequency, nocturia, and urgency, were more strongly associated with allergic disease burden than voiding symptoms. These findings

Table 2. Correlation between allergic disease characteristics and lower urinary tract symptoms

Symptom		Disease duration (ρ)	p-value	95% CI	Disease severity (ρ)	p-value	95% CI
Storage symptoms	Daytime urinary frequency	0.245	**0.010**	0.061-0.413	0.186	**0.049**	0.000-0.360
	Nocturia	0.198	**0.037**	0.012-0.371	0.212	**0.026**	0.027-0.383
	Urgency	0.134	0.161		0.247	**0.009**	0.064-0.414
	Urinary incontinence	0.091	0.345		0.101	0.294	
Voiding symptoms	Interrupted urinary stream	0.044	0.649		0.151	0.114	
	Hesitancy	0.077	0.420		0.058	0.548	
	Sensation of incomplete bladder emptying	0.187	**0.049**	0.001-0.361	0.117	0.222	

Bold values indicate statistically significant results (p<0.05)
ρ: Spearman's correlation coefficient, CI: Confidence interval

suggest that within an allergic adolescent population, the clinical burden of allergic respiratory disease may be more strongly associated with urinary symptom burden than with disease phenotype alone. Overall, DVISS scores were low in both groups, suggesting a possible floor effect. Consistent with this, only a very small proportion of patients exceeded the suggested threshold for clinically significant voiding dysfunction. In addition, the observed correlations were weak to modest, and the multivariable model explained only a limited proportion of the variance in urinary symptom burden. Therefore, disease duration and severity should be interpreted as two clinical factors associated with DVISS scores rather than as dominant determinants of LUTS.

Previous studies have consistently reported an association between allergic diseases and pediatric LUTS. Children with AR, asthma, eczema, and other atopic disorders have been shown to have a higher prevalence of overactive bladder, urinary urgency, and voiding dysfunction than healthy controls. However, most previous investigations primarily evaluated allergic diseases as dichotomous variables (present or absent), whereas relatively little attention has been given to the impact of disease burden on urinary symptoms (4,5,8,9,18). Importantly, the present study did not include a healthy, non-allergic control group, and therefore cannot determine whether adolescents with AR have a higher prevalence or greater severity of LUTS than non-allergic adolescents. Rather, our findings indicate that disease duration and clinical severity are more closely associated with LUTS than asthma itself. This observation suggests that chronic inflammatory activity and cumulative symptom burden may have greater clinical relevance than disease phenotype alone.

The mechanisms linking allergic respiratory diseases and LUTS are likely multifactorial. Experimental and clinical studies have demonstrated that mast cell activation, eosinophilic inflammation, and neuroimmune interactions contribute to bladder hypersensitivity through the release of inflammatory mediators, including histamine, leukotrienes, nerve growth factor, and various neuropeptides. These mediators increase the excitability of bladder afferent nerves and promote sensory dysfunction, potentially leading to urgency, increased daytime urinary frequency, and nocturia (4,7,19,20). The predominance of storage symptoms observed in our cohort is consistent with this proposed pathophysiological framework and may suggest a relationship between allergic disease burden and bladder sensory symptoms rather than voiding-phase dysfunction.

Laboratory markers of atopy, including peripheral eosinophil count, eosinophil percentage, and total serum IgE levels, were not significantly associated with urinary symptom burden. Although these biomarkers are commonly used to characterize type 2 inflammation and atopic status in allergic airway disease, their ability to reflect local inflammatory processes in non-respiratory target organs may be limited (21,22,23). These findings suggest that systemic biomarkers may not adequately reflect the local inflammatory and neuroimmune processes involved in bladder dysfunction. Instead, clinical indicators of disease activity, such as disease duration, symptom severity, and patient-reported symptom burden, may better represent the cumulative inflammatory exposure influencing lower urinary tract function.

In the exploratory aeroallergen analysis, outdoor allergen sensitization was associated with higher total DVISS scores and a higher frequency of urgency. This finding may be biologically plausible, as outdoor allergens, particularly pollen, can be associated with seasonal increases in allergic symptoms and systemic inflammatory burden, potentially amplifying bladder sensory symptoms. Supporting this hypothesis, previous data from patients with urologic chronic pelvic pain syndrome suggested that elevated pollen levels may be linked to symptom flares, especially among individuals with allergies, possibly through mast cell activation and histamine release (24). However, this evidence comes from adults with chronic pelvic pain and cannot be directly extrapolated to adolescents with AR. Moreover, because our aeroallergen analysis was exploratory, subgroup sizes were limited, and no correction for multiple comparisons was applied, the observed association between outdoor sensitization and urgency should be interpreted cautiously and considered hypothesis-generating, rather than confirmatory.

The present study has several strengths. To our knowledge, this is one of the few studies to evaluate the relationship between the clinical burden of allergic respiratory disease and LUTS using both symptom-based and multivariable analytical approaches. In addition to comparing AR alone to AR accompanied by asthma, we assessed disease duration, disease severity, VAS and MS, laboratory parameters, aeroallergen sensitization profiles, and individual LUTS components. This comprehensive evaluation allowed us to examine clinical factors associated with urinary symptom severity beyond the disease phenotype.

Study Limitations

Nevertheless, several limitations should be acknowledged. First, the cross-sectional design precludes any causal inference between allergic disease and LUTS. Second, this was a single-center study with a relatively modest sample size, which may limit the generalizability of the findings. Because all participants were recruited from a pediatric allergy and immunology outpatient clinic, selection bias is possible; this referral-based setting may have enriched the cohort with adolescents who had more symptomatic, persistent, or treatment-requiring allergic disease. Therefore, our findings may not be directly generalizable

to adolescents with milder AR in the general population. In addition, the lack of a non-allergic healthy control group prevented us from determining whether adolescents with AR have a higher prevalence or greater severity of LUTS than non-allergic adolescents.

Several methodological limitations should also be considered. The low median DVISS scores observed in both groups may indicate a floor effect, and the modest correlation coefficients and the limited explanatory power of the regression model should be considered when interpreting the clinical relevance of the findings. Correction for multiple comparisons was not applied; therefore, borderline statistically significant findings should be interpreted cautiously and considered exploratory. Although the DVISS is a validated pediatric instrument, its validation specifically for adolescents aged 12-18 years is limited. Objective functional assessments, such as uroflowmetry or urodynamic studies, were not performed; potential confounders, including body mass index, pubertal stage, detailed control status for asthma and AR, and fluid intake, were not available. The study-defined MS has not been externally validated. Finally, histopathological evaluation of bladder tissue was not available; therefore, potential local inflammatory changes, such as mast cell or eosinophilic infiltration, could not be assessed despite their proposed role in bladder hypersensitivity and LUTS-like presentations (4,23,25). Longitudinal studies are warranted to determine whether changes in allergic disease control over time are associated with changes in LUTS.

Conclusion

Among adolescents with allergic respiratory diseases, the coexistence of asthma was not associated with a greater burden of LUTS than AR alone. However, longer disease duration and greater disease severity were weak to modest factors associated with a higher urinary symptom burden, particularly storage symptoms, such as daytime urinary frequency, urgency, and nocturia. These findings suggest that the clinical burden of allergic respiratory disease, rather than disease phenotype alone, may be associated with greater LUTS burden. These findings support consideration of LUTS in adolescents with chronic or more severe allergic respiratory disease; however, further prospective studies are required before routine clinical recommendations can be made. Further prospective studies incorporating objective urological assessments and investigations of bladder inflammatory mechanisms are warranted to clarify the underlying pathophysiological pathways.

Ethics

Ethics Committee Approval: The study protocol was approved by the University of Health Sciences Türkiye, Dr. Behçet Uz Pediatric Disease and Surgery Training and Research Hospital Non-Interventional Research Ethics Committee (approval number: GOA-386, date: 04.06.2026).

Informed Consent: Written informed consent was obtained from the parents or legal guardians of all participants, and assent was obtained from adolescents when appropriate.

Footnotes

Authorship Contributions

Concept: F.Ç.Ç., Design: F.Ç.Ç., A.E., Data Collection or Processing: F.Ç.Ç., Analysis or Interpretation: A.E., Literature Search: F.Ç.Ç., A.E., Writing: F.Ç.Ç., AE.

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

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