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ORIGINAL ARTICLE

Psychiatric symptoms in children with overactive bladder and underactive bladder

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KEYWORDS
Pediatric population (children);
Overactive bladder;
Underactive bladder;
Psychiatric symptoms;
Behavioral problems;
Anxiety;
Depression

Abstract
Objectives: The aim of the study was to assess psychiatric manifestations, including externalizing and internalizing symptoms, as well as anxiety and depression symptoms, in children diagnosed with overactive bladder (OAB) and underactive bladder (UAB).
Methods: The study included 53 children with a diagnosis of OAB, 23 children with a diagnosis of UAB, and 30 controls. Participating children completed the Revised Child Anxiety and Depression Scale–Child Version (RCADS-C), while their parents completed the Strengths and Difficulties Questionnaire (SDQ).
Results: There were no statistically significant differences among the three groups in terms of age, sex, socioeconomic status, or years of education ($P > .05$). The SDQ subscale comparisons revealed that children with OAB scored significantly higher in conduct problems, hyperactivity, and externalizing problems compared to both children with UAB and controls ($P = .024$, $P = .013$, and $P = .034$, respectively). No significant differences were found among groups in emotional symptoms, peer relationship problems, prosocial behavior, or internalizing problems ($P > .05$). Similarly, RCADS anxiety and depression scores did not differ significantly between groups ($P > .05$).
Discussion: Our findings suggest that externalizing psychiatric symptoms are more prevalent in children diagnosed with OAB than children with UAB or healthy controls. These behavioral issues may be associated with delayed cortical maturation. Longitudinal studies using neuroimaging techniques are needed to further explore this association. Routine screening for psychiatric symptoms in children with bladder dysfunction may improve treatment outcomes and support a more comprehensive care approach.
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PALABRAS CLAVE
Población pediátrica;
Vejiga hiperactiva;
Vejiga hipoactiva;
Síntomas psicopatológicos;
Alteraciones conductuales;
Ansiedad;
Depresión

Síntomas psicopatológicos en la población pediátrica con vejiga hiperactiva e hipoactiva

Resumen
Objetivos: El objetivo de este estudio fue evaluar la presencia y la intensidad de síntomas psicopatológicos, incluyendo alteraciones externalizantes e internalizantes, así como manifestaciones de ansiedad y depresión, en los pacientes pediátricos con diagnóstico confirmado de vejiga hiperactiva (OAB, por sus siglas en inglés) y vejiga hipoactiva (UAB, por sus siglas en inglés).
Métodos: Se incluyeron 53 pacientes pediátricos con diagnóstico de OAB, 23 con UAB y un grupo control de 30 sujetos sanos. Los participantes completaron la *Revised Child Anxiety and Depression Scale–Child Version* (RCADS-C), mientras que sus progenitores respondieron el *Strengths and Difficulties Questionnaire* (SDQ). Se aplicaron análisis comparativos mediante pruebas de hipótesis y modelos ajustados por variables demográficas y educativas.
Resultados: No se observaron diferencias estadísticamente significativas entre los 3 grupos en cuanto a edad, sexo, nivel socioeconómico o años de escolarización ($P > ,05$). Las comparaciones de las subescalas del SDQ revelaron que los niños OAB obtuvieron puntuaciones significativamente más altas en problemas de conducta, déficit de atención/hiperactividad y problemas externalizantes en comparación con los grupos de UAB y el grupo control ($P = ,024$; $P = ,013$; y $P = ,034$, respectivamente). No se encontraron diferencias significativas entre los grupos en problemas emocionales, problemas con los iguales, conducta prosocial o puntuaciones de problemas internalizantes ($P > ,05$). Del mismo modo, las puntuaciones de ansiedad y depresión del RCADS no mostraron diferencias estadísticamente significativas entre los grupos ($P > ,05$).
Discusión: Nuestros hallazgos sugieren que los síntomas psiquiátricos externalizantes son más frecuentes en niños diagnosticados con OAB en comparación con aquellos con UAB o controles sanos. Estos problemas de conducta podrían estar relacionados con una maduración cortical retrasada. Se recomiendan estudios longitudinales adicionales que incorporen técnicas de neuroimagen para explorar esta posible asociación. La implementación de un cribado sistemático de síntomas psiquiátricos en niños con disfunción vesical podría mejorar los resultados del tratamiento y favorecer un enfoque de atención más integral.
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Introduction

The physiological function of the bladder and lower urinary tract (LUT) evolves along with a child's growth. Normal bladder and urethral sphincter development are crucial for the central and voluntary control of urination. By age 5, this milestone is expected to be achieved through maturational processes.[1] According to the International Children's Continence Society (ICCS), overactive bladder (OAB) is characterized by symptoms such urinary urgency, increased frequency of urination, and nocturia. The diagnosis is typically based on the exclusion of urinary tract infection and other diseases that could cause similar symptoms.[2,3] The prevalence of OAB in the pediatric population ranges between 5% and 12% in young children, gradually decreasing to around 0.5% among adolescents aged 16–17 years.[4] Children with OAB usually have detrusor overactivity, and the most common symptom is frequent urination (85%), followed by urgency (54%) and incontinence (36%). These urinary symptoms can lead to social withdrawal and psychological stress in affected children.[5] Underactive bladder (UAB), on the other hand, is a cause of lower urinary tract dysfunction (LUTD) whose prevalence increases with age. It is characterized by detrusor underactivity with reduced strength and/or duration of urination, leading to an inability to fully empty the bladder.[6] Clinically, it is associated with low voiding frequency during the day and/or significant residual urine volumes. Underactive bladder is frequently identified through observation of abnormal detrusor function on urodynamic testing. The flow pattern may be plateau-shaped; and pressure flow studies can differentiate it from bladder outlet obstruction.[3]

Recent research on the pathophysiology of OAB has shifted from bladder-centric theories to cortical-focused theories.[7] One hypothesis suggests that in childhood, the cortical mechanism that suppresses detrusor muscle activity does not immediately reach maturity, delaying the emergence of normal adult-style voiding.[8] This maturational delay entails that detrusor hyperactivity will persist until cortical inhibition mechanisms are fully functional, resulting in high-pressure voiding.[7,8] The role of cortical development in the pathophysiology of OAB in children is further supported by evidence that some children with resistant OAB also exhibit neuropsychiatric conditions such as attention-deficit/hyperactivity disorder (ADHD), obsessive-compulsive disorder (OCD), or panic disorder.[9–11] To date, few studies

have been published regarding the presence of psychiatric symptoms in children diagnosed with underactive bladder.

In brief, the relationship between bladder dysfunction and psychiatric disorders remains unclear. Therefore, we designed a study to explore the presence and nature of psychiatric symptoms in children diagnosed with overactive bladder (OAB) and underactive bladder (UAB). Specifically, the objectives were to analyze the prevalence and severity of externalizing symptoms (eg, attention-deficit/hyperactivity, behavioral problems) and internalizing symptoms (eg, anxiety, depression, emotional difficulties) in these patients. In this context, we formulated the following hypotheses: (1) In children with a diagnosis of OAB, the levels of externalizing problems—such as inattention, hyperactivity, and conduct-related issues—will be significantly higher compared to both children with UAB and healthy controls. (2) Children with OAB will also exhibit higher levels of internalizing symptoms—such as anxiety and depressive features—compared to children with UAB and controls. These hypotheses are grounded in emerging neurodevelopmental theories that link OAB in children to delayed cortical maturation, particularly in areas involved in inhibitory control and emotional regulation. Furthermore, we aimed to address a gap in the current literature by including a comparative analysis of psychiatric symptoms in children with OAB, an area that has received limited attention in research to date.

Material and methods

Participants

Between May 2023 and to December 2023, we invited children aged 10–15 years referred to a pediatric urology outpatient clinic and diagnosed with overactive bladder (OAB) or underactive bladder (UAB) according to the ICCS diagnostic criteria to participate in a single-center study.[3] Initially, 60 children with OAB and 28 children with UAB were eligible for inclusion. Seven children with OAB and five children with UAB were excluded from the study due to parental refusal to participate.

Clinical interviews were conducted with both the children and their parents to assess inclusion and exclusion criteria uniformly across all groups. Children aged 10 to 5 years who met the ICCS diagnostic criteria for OAB or UAB and whose parents provided informed consent were included. The exclusion criteria were as follows: (1) presence of intellectual disabilities, autism spectrum disorder, or psychotic disorders; (2) congenital or chromosomal anomalies; (3) history of significant or chronic medical conditions such as asthma, diabetes, immunodeficiency, or cancer; (4) known neurological or metabolic disorders, such as epilepsy, migraine, spina bifida, or cerebral palsy; (5) history of sleep apnea or other sleep disorders that could cause manifestations similar to those of attention-deficit/hyperactivity disorder (ADHD); and (6) a relevant family history (first-degree relatives) of major psychiatric disorders; and (7) structural abnormalities of the urogenital tract, including hydronephrosis or vesicoureteral reflux.

The control group was recruited during the same period among children who visited the pediatric urology outpatient clinic and did not receive a diagnosis of voiding dysfunction. It comprised 30 children without congenital anomalies, lower urinary tract symptoms, or urological complaints, all of whom agreed to participate in the study. Good academic performance was confirmed through parental reports and the clinical evaluation. We applied the same exclusion criteria to all groups.

The study was approved by the local ethics committee (2023/B.30.2.ATA.0.01.00/403). We obtained verbal and written informed consent from the parents of each participant prior to enrolment. The study had a cross-sectional case-control design.

Procedure

For each participant, we obtained a comprehensive medical history covering psychomotor development, toilet training, urination habits, sleep patterns, and family history. In addition to the physical examination, venous blood and urine samples were collected to exclude potential organic disorders such as diabetes, antidiuretic hormone deficiency, or urinary tract infections. Ultrasound was performed to assess for bladder and urinary tract abnormalities. Participants were instructed to keep a detailed bladder diary over three days, documenting episodes of nocturnal enuresis and daytime urinary frequency. Finally, uroflowmetry was conducted in the case groups to measure voiding flow rate, voided volume, and voiding time; however, this test was not performed in the control group. After the initial diagnosis, children who agreed to participate in the study completed the Revised Child Anxiety and Depression Scale-Child Version (RCADS-C), and their parents completed the sociodemographic data form, the Hollingshead-Redlich Index of Social Position, and the Strengths and Difficulties Questionnaire (SDQ). All instruments were self-administered by the participants under the supervision of a physician in a quiet setting to ensure privacy and comprehension. Incomplete questionnaires were excluded from the final analysis. All cases completed at least 95% of the questionnaires administered, and no participants were excluded due to missing data.

Data collection instruments

Sociodemographic data form: This form, created by the researchers, was designed and administered to gather information on the characteristics of participants and their families, including age, sex, gestational length, delivery type, developmental milestones (such as walking, talking, and toilet training), family structure, and residential setting.

Hollingshead-Redlich Index of Social Position: this scale was used to assess socioeconomic status (SES) according to parental occupation and educational attainment and classifies it into five levels. It is scored based on the parent with the highest occupational and educational level, with levels 1 and 2 indicating high SES, level 3 middle SES, and levels 4 and 5 indicating low SES.[12]

Strengths and Difficulties Questionnaire (SDQ): Originally developed by Robert Goodman in 1997, the Turkish adaptation and validation of the SDQ were

Table 1 Characteristics of patients and controls.

	Groups			*P*	
	Control	OAB	UAB		
Age, mean (SD)		13.16 (3.04)	12.96 (3.12)	12.82 (3.46)	.95*
Sex	Female, n (%)	14 (46.6%)	29 (54.8%)	11 (47.8%)	.78
	Male, n (%)	16 (53.4%)	24 (45.2%)	12 (52.2%)	
Socioeconomic	High	12 (40%)	25 (47.2%)	9 (45%)	.63**
Status***	Middle	10 (33.3%)	12 (22.7%)	6 (30%)	
	Low	8 (26.7%)	16 (30.1%)	5 (25%)	
Years of schooling, mean (SD)		7.86 (2.14)	7.03 (1.86)	7.47 (1.91)	.41*

Abbreviations: OAB, overactive bladder; UAB, underactive bladder.
* ANOVA.
** χ^2 test. The significance level was set at $P < .05$.
*** Socioeconomic status (SES) assessed with the Hollingshead-Redlich index.

conducted by Güvenir et al. in 2008.[13] The SDQ comprises 25 items that assess positive and negative behaviors and is divided into five subscales: ''conduct problems,'' ''hyperactivity/inattention'' ''emotional symptoms,'' ''peer relationship problems,'' and ''prosocial behaviors.'' The combined scores for ''conduct problems'' and ''hyperactivity/inattention'' give rise to the ''externalizing problems'' score, while the combination of ''emotional problems'' and ''peer problems'' provides the ''internalizing problems'' score. Each subscale can be evaluated individually, and the sum of the first four subscales (conduct problems, hyperactivity/inattention, emotional symptoms, and peer relationship problems) yields the ''total difficulties score''. High scores in prosocial behavior indicate strengths in the social domain, while high scores in the other four domains indicate the severity in those problem areas.[13]

Revised Child Anxiety and Depression Scale-child version (RCADS-C): The RCADS was developed to measure DSM-IV-based symptoms of anxiety disorders and depression in children and adolescents.[14] It consists of 47 items, with subscales for separation anxiety (7 items), social phobia (9 items), generalized anxiety disorder (6 items), panic disorder (9 items), obsessive-compulsive disorder (6 items), and depression (10 items). Responses are rated on a 4-point Likert scale: 0 = never, 1 = sometimes, 2 = often, and 3 = always. The scale was translated to Turkish by Görmez et al. in 2017.[14]

Statistical analysis

All statistical analyses were performed with the software SPSS version 26.0 (IBM Corp; Armonk, NY, USA). To assess the normality of the data, we used Kolmogorov-Smirnov test. In the descriptive analysis, we used the mean and standard deviation(SD) for normally distributed quantitative data, and expressed categorical variables as absolute frequencies and percentages. The ANOVA test was used to compare parametric variables in three independent groups. We compared discrete data by means of the χ^2 test. The Kruskal-Wallis test was used to compare nonparametric variables in three independent groups, and pairwise comparisons were made using the Dunn test with the Bonferroni correction to determine which group created the difference identified Kruskal Wallis test. We set the level of confidence at 95% and considered *P* values of less than .05 statistically significant.

We calculated the minimum sample size required to achieve statistical significance with the software G*Power version 3.1.9.4 (Heinrich Heine University; Düsseldorf, Germany). The assumed medium effect size (f = 0.25) was derived from between-group differences reported in a similar study by Özyurt et al.,[15] in which the RCADS total anxiety and subscale scores served as primary outcome measures in a three-group comparison design. Based on these parameters, a priori power analysis for one-way ANOVA (fixed effects, three groups), for an alpha level of 0.05, a statistical power of 0.80, and an equal allocation ratio (1:1:1), indicated a minimum necessary sample size of 64 participants, corresponding to approximately 21 or 22 participants per group. To account for potential missing data and losses to follow-up, the final sample size was increased to 106 participants (53 OAB, 23 UAB, and 30 controls). Although the power analysis assumed equal group sizes, the unequal final distribution reflects real-world recruitment constraints, particularly due to the relative rarity and the diagnostic challenges of UAB in the pediatric population.[3]

Results

The sample included 53 children with overactive bladder (OAB), 23 with underactive bladder (UAB), and 30 healthy controls. There were no significant differences between the three groups in terms of age, sex, socioeconomic status, and years of schooling (Table 1).

As expected, uroflowmetry findings differed significantly between the OAB and UAB groups. Children with UAB exhibited significantly longer flow times, voiding times, and higher voided volumes ($P < .001$). However, there were no significant intergroup differences in average flow rate or delay time in voiding (Table 2).

There were significant differences between groups in several SDQ subscales. Children in the OAB group had significantly higher scores in conduct problems, hyperactivity/inattention, externalizing problems, and total difficulties compared to both the control and UAB groups ($P < .005$). We found no significant differences between groups for

Table 2 Uroflowmetry and voiding frequency findings.

	Children with OAB (n = 53)	Children with UAB (n = 23)	*P*
Uroflowmetry			
Delay time (s)	3.5 (3—6)	5 (3—10)	.14
Voiding time (s)	22 (15—33,2)	44 (29—57)	**< .001**
Average flow rate (mL/s)	13.2 (8—19.2)	9.5 (7.3—17.2)	.45
Flow time (s)	15 (10—21.5)	38 (23—52)	**< .001**
Voiding volume (mL)	163 (110—268.2)	495.5 (272—574)	**< .001**

Abbreviations: OAB, overactive bladder; UAB, underactive bladder.

Table 3 Comparison of SDQ scores between groups using the Kruskal-Wallis test.

	Group	n	Mean Rank	Df	X^2	*P*
Emotional symptoms	Control	30	47.12	2	2.007	.367
	Overactive	53	56.97			
	Underactive	23	53.83			
Conduct problems	Control	30	45.67	2	**7.487**	**.024***
	Overactive	53	58.75			
	Underactive	23	38.57			
Hyperactivity/inattention	Control	30	41.03	2	**8.702**	**.013***
	Overactive	53	61.40			
	Underactive	23	51.57			
Peer relationship problems	Control	30	51.58	2	0.392	.822
	Overactive	53	55.34			
	Underactive	23	51.76			
Prosocial behavior	Control	30	58.92	2	1.017	.601
	Overactive	53	54.92			
	Underactive	23	56.22			
Total difficulties score	Control	30	44.98	2	**6.378**	**.041***
	Overactive	53	60.97			
	Underactive	23	45.39			
Externalizing score	Control	30	46.28	2	**6.838**	**.034***
	Overactive	53	61.25			
	Underactive	23	45.04			
Internalizing score	Control	30	47.62	2	2.040	.361
	Overactive	53	57.44			
	Underactive	23	52.09			

Abbreviation: SDQ, Strengths and Difficulties Questionnaire.
* Significance level: $P < .05$.

emotional symptoms, peer relationship problems, prosocial behavior, or internalizing problems (Tables 3 and 4).

Finally, there were no significant differences among the groups in any of the RCADS anxiety or depression subscales, including separation anxiety, generalized anxiety, panic disorder, social anxiety, obsessive-compulsive disorder, and major depressive disorder (Table 5).

Discussion

In this study, screening for psychiatric symptoms in children diagnosed with OAB and UAB revealed that children with OAB had externalizing symptoms more frequently, with no differences between the groups in anxiety and depressive symptoms.

The literature highlights a frequent co-occurrence of lower urinary tract dysfunction (LUTD), such as OAB, nocturnal enuresis, or UAB, and mental health problems like low self-esteem, attachment-related problems, depression, anxiety disorders, and attention-deficit/hyperactivity disorder (ADHD).[9–11,16] Many studies focus on the association between nocturnal enuresis and ADHD, consistently reporting higher frequencies of ADHD among children with nocturnal enuresis.[17–19] Niemczyk et al. also reported that 14.5% of children with a diagnosis of monosymptomatic nocturnal enuresis exhibited externalizing problems.[20] Several studies have documented a co-occurrence rate of 10.5%–21% between ADHD and daytime urinary incontinence in children.[18,21,22] Furthermore, Özen et al. found that 29.4% of 156 children with a diagnosis of LUTD of any kind had a psychiatric comorbidity, and the authors suggested that the combined use of psychiatric screening scales and bladder diaries could be beneficial.[18] Recent consensus-based reviews further emphasize that psychological comorbidities

Table 4 Dunn pairwise comparison test.

SDQ	Conduct problems	Hyperactivity/inattention	Externalizing Score	Total Difficulty Score
Overactive/Control	***P*** = .042*	***P*** = .010*	***P*** = .029*	***P*** = .022*
	e.s. = 0.23	**e.s. = 0.32**	**e.s. = 0.26**	**e.s. = 0.28**
Control/Underactive	***P*** = .038*	*P* = .212	*P* = .884	*P* = .777
	e.s. = 0.28	e.s. = n.s.	e.s. = n.s.	e.s. = n.s.
Overactive/Underactive	***P*** = .021*	*P* = .196	***P*** = .031	***P*** = .046*
	e.s. = 0.31	e.s. = n.s.	**e.s. = 0.29**	**e.s. = 0.25**

Abbreviations: e.s., effect size; n.s., not significant; SDQ, Strengths and Difficulties Questionnaire.

Table 5 Comparison of RCADS-C scores between groups using the Kruskal-Wallis test.

	Group	N	Mean Rank	Df	X^2	*P*
Separation anxiety disorder	Control	30	51.08	2	1.554	.460
	Overactive	53	57.08			
	Underactive	23	48.39			
Generalized anxiety disorder	Control	30	60.98	2	2.709	.258
	Overactive	53	51.58			
	Underactive	23	48.15			
Panic disorder	Control	30	8.57	2	1.723	.423
	Overactive	53	53.25			
	Underactive	23	47.46			
Social anxiety disorder	Control	30	55.82	2	1.055	.590
	Overactive	53	54.68			
	Underactive	23	47.76			
Obsessive compulsive disorder	Control	30	55.60	2	0.247	.884
	Overactive	53	53.19			
	Underactive	23	51.48			
Major depressive disorder	Control	30	57.45	2	2.919	.232
	Overactive	53	55.50			
	Underactive	23	43.98			
RCADS total anxiety	Control	30	57.65	2	1.369	.504
	Overactive	53	53.67			
	Underactive	23	47.70			

Significance level: $P < .05$.

are consistently more frequent in patients with LUTD across the lifespan, and that complex neurodevelopmental models may better explain these associations than simple unidirectional causation.[23] While there is a recognized association between LUTD and psychiatric disorders, the underlying pathophysiology of this association is complex and remains unclear. Furthermore, treating comorbid psychiatric conditions has been found to improve adherence to treatment for LUTD.[18] Although the exact mechanisms remain unknown, recent findings indicate that methylphenidate, a common ADHD medication, can increase bladder capacity and voided volume, potentially due to its effects on the dopaminergic and noradrenergic systems.[24] Studies examining psychiatric symptoms in children with UAB are notably scarce in the literature. A distinguishing feature of our study is the comparative analysis between OAB, UAB, and control groups. In agreement with the previous literature, we found that children with OAB had significantly higher SDQ externalizing problem scores. The internalizing problems scores in the SDQ did not differ significantly among the three groups. Of note, the relative rarity of externalizing symptoms in the UAB group suggests that psychiatric associations may not apply uniformly to all LUTD subtypes. Most previous studies have analysed heterogeneous samples of patients with LUTD without distinguishing between OAB and UAB, which may obscure potential subtype-specific differences.

Externalizing disorders encompass diagnoses such as oppositional defiant disorder, conduct disorder, or ADHD.[25] Research on the etiology of externalizing problems has identified differences in cortical thickness between the posterior region and frontal lobes, indicating delayed cortical maturation.[26] Bladder control similarly depends on the maturation of cortical inhibitory networks that suppress detrusor activity through prefrontal-pontine pathways. Contemporary models propose that shared neurobiological mechanisms, including delayed maturation of inhibitory control circuits and stress-regulation systems, may contribute to the co-occurrence of LUTD and psychiatric symptoms.[23] In children, OAB may be associated with delayed maturation

of cortical inhibitory control networks, potentially linking urgency symptoms with externalizing behaviors through shared frontostriatal and prefrontal regulatory mechanisms. In addition, altered stress regulation, including possible HPA-axis dysregulation, may further contribute to the co-occurrence of behavioral problems and detrusor overactivity, whereas the etiology of UAB may rather involve peripheral or sensorimotor mechanisms.[23] Within this framework, it is conceivable that immature executive control mechanisms could contribute both to behavioral dysregulation and to the urgency symptoms observed in OAB. However, as our study did not include neuroimaging or neurophysiological measures, this interpretation should be considered hypothesis-generating rather than confirmatory. Emerging hypotheses regarding the pathophysiology of OAB are consistent with this neurodevelopmental perspective. Future studies incorporating neuroimaging would be valuable to further explore this hypothesis. In contrast, UAB is characterized by reduced detrusor contractility or altered bladder sensation, mechanisms that may involve peripheral or sensorimotor pathways to a greater extent than cortical inhibitory dysfunction. This pathophysiological distinction may partly account for the low frequency of externalizing symptoms in the UAB group. However, although our findings suggest potential neurobehavioral differences between OAB and UAB, they should be interpreted cautiously in light of the relatively small subset of patients with UAB and the lack of performance of uroflowmetry in the control group, which may limit the exclusion of subclinical voiding dysfunction.

The prevalence of LUTD is increasing, impacting the quality of life, sleep, and psychological wellbeing of both children and adults. Studies have demonstrated a bidirectional relationship between LUTD and anxiety and depression.[27] Similarly, recent studies emphasize associations between OAB and stress and environmental factors.[28] Some studies suggest that anxiety and depression may be risk factors for OAB, and serotonergic or anticholinergic medications could potentially alleviate OAB symptoms.[29] In one study from a urogynecology clinic, 26.2% of women who received a diagnosis of OAB were also diagnosed with an anxiety disorder, and the authors recommended screening for anxiety symptoms in OAB patients.[28] Most prior studies have focused on adult populations, which may partly explain the discrepancies with pediatric findings. Adult-based research more frequently reports associations with internalizing disorders, whereas pediatric research finds externalizing symptoms more consistently.[23] Developmental differences may therefore account for the absence of significant anxiety and depressive symptoms in our pediatric sample. It is possible that behavioral problems are earlier signs of vulnerability, whereas internalizing symptoms may become more prominent later in adolescence or adulthood. Given the limited number of pediatric studies, our investigation addressed this gap by assessing anxiety and depressive symptoms specifically in children with OAB and UAB. In our cohort, we found no differences in either RCADS anxiety and depression subscale scores or SDQ internalizing problems scores between the groups, indicating consistency across emotional symptom measures. The divergence from the predominant findings in adults may therefore reflect developmental stage differences rather than a true absence of psychological vulnerability.

From a clinical standpoint, consensus recommendations propose routine psychological screening in patients with LUTD.[23] Our findings support this approach, particularly in children with OAB, in whom externalizing symptoms may be more prevalent. Furthermore, there is evidence that LUTD can have a psychosocial impact at family level, with a correlation between caregiver emotional distress and child behavioral problems.[30] Therefore, a multidisciplinary evaluation addressing both urological and psychosocial domains may be beneficial.

Limitations

Our study was conducted in a single center, and the number of children diagnosed with underactive bladder (UAB) was relatively small. Consequently, multicenter studies with larger samples are needed to corroborate these findings. Additionally, uroflowmetry was not performed in the control group, which may limit the exclusion of subclinical voiding dysfunction, although controls were carefully screened and reported no lower urinary tract symptoms. Furthermore, various scales are available for psychiatric evaluation, and we believe that using self-report scales for differential diagnosis of externalizing problems, such as ADHD, oppositional defiant disorder, and conduct disorder, could be beneficial for a more comprehensive assessment.

Conclusion

In this study, we observed that children with OAB had higher externalizing problems and total scores on the SDQ, which screens for general psychiatric symptoms, compared to the other groups. The SDQ scores of children with UAB, however, were similar to those of healthy controls. There were no significant differences between the three groups in the RCADS scores, which measures symptoms of anxiety and depression. These findings suggest that psychiatric symptom profiles in pediatric LUTD may vary according to the type of dysfunction, with externalizing symptoms more strongly associated with OAB than with UAB. The observed pattern raises the possibility that OAB and UAB differ not only in urodynamic characteristics but also in their neurodevelopmental and neurobehavioral correlates. It is reasonable to assume that immature inhibitory control networks and altered stress-regulation mechanisms may contribute to both behavioral dysregulation and detrusor overactivity in OAB. However, given the cross-sectional design of our study, these interpretations should be considered hypothesis-generating rather than confirmatory. Longitudinal studies incorporating neuroimaging, neuropsychological assessment, and biological stress markers are needed to clarify potential causal mechanisms and developmental trajectories. From a clinical perspective, our findings support the value of psychiatric screening—particularly for externalizing symptoms—in children with bladder dysfunction as part of a comprehensive and multidisciplinary approach to their management.

Author contributions

The study was designed by GYT, HD and GT; GYT, AC and HD collected data; GYT and HFA contributed to the analysis and interpretation of the data; GYT, HFA and GT drafted the article and revised it. All authors read and approved the final manuscript.

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Declaration of competing interest

The authors have no conflicts of interest to declare.

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