

Quality of life, cognitive level and school performance in children with functional lower urinary tract dysfunction

Qualidade de vida, nível cognitivo e desempenho escolar em crianças portadoras de distúrbio funcional do trato urinário inferior

Authors

Lorena Andrade Veloso ¹
Maria Júlia Gonçalves de Mello ²

José Pacheco Martins
Ribeiro Neto ¹

Leopoldo Nelson
Fernandes Barbosa ³

Eduardo Just da Costa e
Silva ³

¹ IMIP.

² Universidade de
Pernambuco.

³ Universidade Federal de
Pernambuco.

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Correspondence to:

Lorena Andrade Veloso.
Unidade Renal Pediátrica do
Instituto de Medicina Integral
Prof. Fernando Figueira.
Rua dos Coelhos, nº 300, Boa
Vista, Recife, Pernambuco, Brasil.
CEP: 50070-550
E-mail: lorenaav@hotmail.com

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ABSTRACT

Introduction: Lower urinary tract dysfunction (LUTD) are voiding dysfunctions without anatomical or neurological defects. The diagnosis is primarily clinical, with symptoms standardized by the International Children's Continence Society. Few studies relate quality of life of patients with cognitive and school performance.

Objective: To evaluate milestones of bladder control, daily problems, quality of life (QoL), cognitive function and school performance of children with LUTD.

Methods: Case series of patients followed in the Pediatric Nephrology tertiary hospital with assessment of QoL (Pediatric Quality of Life Inventory - PedsQoL version 4), School Performance Test (TDE) and Raven Progressive Matrices test.

Results: Girls of lower social class were (90.9%) of eligible children. The mean age was 9.1 ± 4.8 years old. The most common symptoms were urge incontinence (81%), holding maneuvers (77.3%) and enuresis (59.1%) associated with the elimination disorder syndrome (63.6%). Caregivers considered volunteers urinary losses and/or symptoms, and fought and/or beat the child. Children had been subjected to embarrassing situations such as warnings of teachers, they hid symptoms and/or the dirty clothes. Mean score of QoL was 71.0 ± 12.6 with the lowest mean score on the school dimension. In TDE 55% had lower performance and in Raven Matrices 60% were intellectually in the medium level. It was observed lower QoL scores in the medium and lower level of TDE and average intellectual capacity/below average in Raven matrices. **Conclusion:** LUTD may negatively affect family and social relationships, school performance and QoL of children with the dysfunction.

Keywords: cognitive science; constipation; lower urinary tract symptoms; pediatrics; psychomotor performance; quality of life; underachievement; urinary incontinence.

RESUMO

Introdução: Distúrbios do Trato Urinário Inferior (DTUI) de causa funcional são disfunções vesicais sem defeitos anatômicos ou neurológicos. O diagnóstico é principalmente clínico, com sintomas padronizados pela International Children's Continence Society. Poucos estudos relacionam qualidade de vida destes pacientes ao nível cognitivo e aproveitamento escolar. **Objetivos:** Avaliar marcos do controle miccional, dificuldades cotidianas, qualidade de vida (QV), nível cognitivo e desempenho escolar de crianças portadoras de DTUI. **Método:** Série de casos de pacientes acompanhados na Nefrologia Pediátrica de hospital terciário com avaliação da QV (Pediatric Quality of Life Inventory - PedsQL), Teste de Desempenho Escolar (TDE) e teste de matrizes progressivas de Raven. **Resultados:** Meninas de classe social menos favorecida foram 90,9% das crianças elegíveis. A média de idade foi $9,1 \pm 4,8$ anos. Os sintomas mais frequentes foram urge-incontinência (81%), manobras de contenção (77,3%) e enurese (59,1%) associados à síndrome do distúrbio de eliminações (63,6%). Cuidadores consideravam as perdas urinárias e/ou sintomas como voluntários, brigavam e/ou batiam na criança. As crianças já tinham sido submetidas a situações constrangedoras e advertências de professores, escondiam sintomas e/ou roupas sujas. O escore médio de QV foi $71,0 \pm 12,6$ com menor média na dimensão escolar. No TDE 55% tiveram desempenho inferior e nas Matrizes de Raven 60% estavam intelectualmente em nível médio. Observaram-se escores menores de QV no nível médio e inferior do TDE e capacidade intelectual média/abaixo da média nas Matrizes de Raven. **Conclusão:** DTUI pode influenciar negativamente relações familiares e sociais, desempenho escolar e qualidade de vida das crianças portadoras.

Palavras-chave: baixo rendimento escolar; ciência cognitiva; constipação intestinal; desempenho psicomotor; incontinência urinária; pediatria; qualidade de vida; sintomas do trato urinário inferior.

INTRODUCTION

Lower urinary tract symptoms (LUTS) is the term used to indicate abnormalities in the functioning and control of this urinary system segment.¹ Changes to the anatomical and/or functional integrity of the components responsible for coordinating the normal storage and urine emptying processes can determine LUTS of neurogenic, anatomic or functional cause. Children with functional LUTS show signs and symptoms determined by detrusor instability or lack of coordination between the detrusor muscle and sphincters without anatomical or neurological defects diagnosed during the investigation.^{2,3}

For many children and adolescents, the presence of functional LUTS entails changes in their daily lives, which may originate from abuse within the family, of learning difficulties and punishments at school, affecting quality of life. Many healthcare professionals and teachers do not have training to understand the symptoms and behavioral changes, or do not know how to handle and educate the children and their caretakers.⁴⁻⁶

Classified according to bladder emptying or filling phase, signs and symptoms of lower urinary tract dysfunction have their standard definitions from the International Children's Continence Society (ICCS)¹ and can be quantified and diagnosed in children and adolescents through the DVSS (Dysfunctional Voiding Scoring Symptom) questionnaire.⁷

Functional LUTS is a diagnosis of exclusion, that is, when signs and symptoms exist and one can rule out neurological and anatomical changes through laboratory tests and imaging exams. The functional disorder is associated with delayed maturation of the bladder control, prolonged childish behavior and abnormal habits during toilet training.^{1,3,8-10}

Functional LUTS often accompanies changes in bowel habits, determining the elimination disorder syndrome. Thus, constipation may originate or be the consequence of urinary disorder. Functional LUTS presents with high morbidity, causing repeated urinary tract infections, vesicoureteral reflux, renal scarring and even end-stage chronic renal disease.^{1,11-13} It is also responsible for psychological changes, stressing the importance of targeting studies towards diagnosis and early treatment, aiming at preventing its physical and psychological consequences.^{1,4-6}

The incidence of functional LUTS found in the literature in children and adolescents can vary from 3.5 to 20%, and can be explained by the methodology as well as the sample employed. Its prevalence is usually higher in girls than in boys and it gradually reduces as the kids age.^{1-4,8,14} A study involving 590 children between 3 and 9 years from the city of Pelotas, Brazil, found that 22.8% of them had some type of voiding dysfunction, with higher prevalence among girls (35.8%) compared to boys (11.2%). Another study by Vaz *et al.*,¹⁵ in Belo Horizonte, showed the presence of urinary incontinence and enuresis in up to 20% of the school-aged children evaluated. Girls had a higher frequency of urinary incontinence, holding maneuvers and urinary urgency.^{4,5,15}

Despite the clinical relevance and emotional impact that may arise from LUTS in a particularly important time for the development of the individual, many parents and caregivers face the symptoms as "normal", while others regard it as "the child being lazy to go to the bathroom" or "not wanting to leave the play" and blame the children for their urinary losses and for wetting their clothes. There are frequent cases of verbal and physical punishment, even submitting the children to embarrassing situations in order to inhibit the disorder.⁴⁻⁶

Despite the increased global interest in studies that assess the quality of life in children and adolescents with different diseases, scientific publications in relation to LUTS in Brazil are still very few.^{6,16} The disease may be a factor that negatively affects the individual's relationships, and it may be associated with developmental deficits and poor quality of life. Even much less frequent are studies that assess more accurately the relationship of the child with the school, as well as how much LUTS and its negative effects can influence the child's development and school performance.⁴⁻⁶

This exploratory study aims to give a description of the sociodemographic aspects regarding voiding control development milestones in children with functional LUTS and submit a reflection on the influence of this disorder in the relationship of these patients with parents, teachers and friends vis-à-vis quality of life, cognitive level and school performance.

METHOD

This exploratory study was carried out, involving a prospective case series of patients with functional LUTS followed at the Pediatric Nephrology clinic of the Integrative Medicine Institute Prof. Fernando Figueira - IMIP, Recife, PE, from September 2013 to March 2014. A consecutive convenience sample was obtained including patients aged 5 to 14 years diagnosed with functional LUTS. We excluded those patients who used medications that altered urinary habits.

Although some of the patients had had the diagnosis of functional LUTS and were being followed up at the clinic, we established a strategy for adding new cases. Initially, our group investigated the frequency of LUTS among the patients who visited the Pediatric Nephrology and Pediatric wards of IMIP.¹⁷ Using the translated and cross-culturally adapted version of the DVSS validated for Brazil⁷ and using six and nine years of age as cutoff points for girls and boys, respectively; 17.7% of the 417 children and adolescents in the study had LUTS symptoms.¹⁸

The patients were seen by a pediatric nephrologist who, following the clinic's routine, made a detailed physical examination to rule out signs of dysraphism and anatomical changes to their genitals; Laboratory tests were performed to rule out urinary tract infection, abnormal renal function, hypercalciuria and hyperuricosuria. Plain radiographs of the lumbosacral spine were taken to rule out bone changes that could compromise the lower urinary tract innervation; and we carried out dynamic and anatomical kidney and urinary tract ultrasound scans - performed by an experienced radiologist (in accordance with guidelines from studies on the use of dynamic ultrasound and functional LUTS¹⁹⁻²¹) to look for bladder behavior during the filling and emptying phases, and to rule out anatomical changes not related to functional LUTS.

We collected the following variables from the sample: age, gender and state of residence (Recife, the state of Pernambuco or from other states). We assessed the caregiver's marital status and the caregiver's and patient's educational level according to number of years of schooling from the age of seven - the age of compulsory education in Brazil. Socioeconomic status was estimated according to the Economic Classification Criterion Brazil from the Brazilian Association of Survey Companies into classes A1, A2, B1, B2, C1, C2, D and E.²²

LUTS symptoms were evaluated following the ICCS definitions.¹ The ages of LUTS symptoms onset, the perception of micturition desire, daytime urination control, nocturnal urination, the weaning of diapers at daytime and nighttime, were all expressed in full years until the event, according to reports from the caregivers.

For quality of life, the average scores were calculated as score-driven by the PedsQL-Generic core Questionnaires (Standard Form) of Measurement Model for the Pediatric Quality of Life inventory™ - Version 4.0 - in its form duly validated for Brazil, the PedsQLInventory™ - Version 4.0.²³

The school performance test (SPT) ranked performance in higher, medium, lower.²⁴ Raven's Progressive Matrices classified children in intellectually superior, above average, average, below average and inferior.^{25,26}

The survey form prepared by the principal investigator was submitted to face and content validation before its application.²⁷ For face validation, they invited three lay persons in relation to LUTS. For content validation, they asked ten experts (pediatricians and/or pediatric nephrologists and psychologist) to discuss the questions and make the necessary adjustments.

Both patient and caregiver were interviewed in a quiet and reserved environment by the principal investigator. The survey form included sociodemographic data, questions related to the patient's daily life, age of symptoms onset and developmental milestones concerning micturition control through an instrument made by the researchers. Following, they employed a standardized questionnaire to assess quality of life in children and adolescents.

The school performance assessment test (SPT)²⁴ was only applied to patients 6-14 years of age. The application of non-verbal intelligence test, the Raven test of progressive matrices^{25,26} was performed by only one psychologist assigned by the study crew.

The data was stored in the database generated by the EpiInfo 3.5.4 software. After double entry, the data was compared, correcting for any errors or discrepancies. The final database was then used for statistical analysis. For a description of categorical variables, we calculated the distribution of frequencies, and for continuous numerical variables, we used the central tendency and dispersion measures. We also

used the contingency table to correlate quality of life and cognitive development, also quality of life and school performance.

The project was approved by the Research in Humans Ethics Committee of the Institute Prof. Fernando Figueira - IMIP with registration number 3662-13. The guardian and the child were informed about the study and its objectives, they agreed to participate and signed the Informed Consent and Study Agreement forms.

The methodological difficulties related to our study are inherent to a case series, which do not allow for causal inferences; however, enabling us to formulate hypotheses. The biases that may arise from the data collection are those related to the information, especially memory, reliability and reproducibility biases. Studies involving past events are subject to recall bias; however, our study involved milestones of child development that are culturally emphasized by parents and caregivers.

In an attempt to reduce bias, the study form and the quality of life form were applied by the principal investigator (pediatric nephrologist) only, and the Raven Progressive Matrices test, as well as the TDE were given by the same psychologist.

RESULTS

During the study period, 22 children with LUTS were eligible for the study and the majority (90.9%) were female (Table 1). The mean age was 9.1 ± 4.8 years and 68.1% (15) had between 8 and 12 years (Table 1). The caregivers were married (77.3%) or had stable partners, and 77.3% came from the interior of Pernambuco. Regarding education, the patients had an average of 4.0 ± 2.2 years of study completed and the caregivers had 10.2 ± 4.5 . In this sample, the patients belonged to lower social classes: C1 (36.4%); C2 (50%) and D (13.6%).

The most frequently reported LUTS symptoms were: urge incontinence (81%), holding maneuvers (77.3%) and enuresis (59.1%), and 63.6% had eliminations disorder syndrome: 59.1% had constipation and one child had fecal incontinence. Two children had urinary urgency, two others had decreased frequency of urination; and dysuria was not reported (Table 1).

As for the milestones in the development of bladder control in these patients, the mean age of voiding desire perception onset was 2.7 ± 3.1 years; weaning from diapers during daytime 3.9 ± 2.6 years

(one child was still in use of diapers during the day), and the weaning of diapers at nighttime 5.6 ± 2.8 years. In approximately 1/3 of the children, LUTS symptoms were reported after a urinary control period considered appropriate, according to the caregivers.

The average age of symptom onset in six of the seven patients who started the symptoms after controlling urination (the mother of one of the patients did not remember the age of onset) was 5.1 ± 2.9 years and none of them reported traumatic events related to the onset of symptoms (Table 1). Two of the 22 caregivers (9.1%) reported having had instructions from healthcare professionals regarding the care to wean the diapers.

Three of the 20 (15%) caregivers said that the signs and symptoms represented a health-related problem of the children (Table 2). The other caregivers believed that urinary incontinence and/or symptoms occurred because the children were lazy to go to the bathroom (90%; 18/20) and/or 75% (15/20) that the losses were voluntary, on purpose. When asked how they would react in the face of children with symptoms of urge incontinence/enuresis, 85% (17/20) of the caregivers reported having yelled at the kid; 35% (7/20) had already beaten the child and 50% (10/20) reported that the child had been subjected to embarrassing situations by them or by other adults. Eight (40%) of 20 had already noticed that the child was hiding wet clothes (Table 2).

When the children with enuresis or urgency/urge incontinence (20) were asked about the most common situations of their day-to-day in relation to other children of their acquaintance, 50% (10/20) answered that the other children knew they had wet their clothes; 46.1% (6/13) reported that other children knew they had enuresis; 45% (9/20) had had to hide their clothes from the other classmates at school; 25% (5/20) said other children often made fun of their problem, and 50% (10/20) had received a nickname because of their LUTS. Among the 13 patients who were allowed to attend the home of friends by their caregivers, 61.5% (8/13) reported that they did not like to go and 53.84% (7/13) claimed to be the LUTS symptoms that prevented them from going. Among the nine who were allowed to sleep over at a friend's place, 88.8% (8/9) of the children said they did not like it, and 77.7% (7/9) reported that the reason was the loss of urine during the night (Table 2).

TABLE 1 DESCRIPTION OF THE BIOLOGICAL CHARACTERISTICS, FREQUENCY, AGE OF SYMPTOM ONSET AND URINARY CONTROL LANDMARKS OF CHILDREN AND TEENAGERS (5 TO 14 YEARS OF LIFE) WITH FUNCTIONAL LUTS, FOLLOWED AT THE PEDIATRIC NEPHROLOGY CLINIC OF THE IMIP FROM SEPTEMBER 2013 THROUGH MARCH, 2014

Variables	N	%
Age		
• 5 -7 years	5	27.2
• 8-12 years	15	68.1
• 13 -14 years	2	9.1
Female gender	19	90.9
LUTS Symptoms		
• Urgency	2	9.1
• Urge-incontinence	18	81.8
• Enuresis	13	59.1
• Holding maneuvers	17	77.3
• Reduction of urination frequency	2	9.1
• Elimination disorder	14	63.6
• Fecal incontinence	1	4.5
• Constipation	13	59
	Mean ± standard deviation	Median(Interquartile range)
Symptoms onset**** (age in years)	5.1 ± 2.9	5.5 (2-6)
Urinary control landmarks (age in years)		
• Micturition day-time control*	2.5 ± 1.2	2.0 (2-3)
• Micturition night-time control*	4.8 ± 2.4	4.5 (3-6)
• Diapers weaning - day**	3.9 ± 2.6	4 (2-5.5)
• Diapers weaning - night***	5.6 ± 2.8	5 (3-8)

*In children who managed to develop some micturition control (7patients) **One child still using diapers during day-time. ***Two children were still wearing diapers during night-time. ****Children who had micturition control and then started to have symptoms after having such control (6 patients).

When asked about the school and about the relationship with teachers (Table 3), 77.3% (17/22) of the children said they liked to go to school, but the teacher only allowed them to go to the bathroom sometimes, rarely or never when requested. Seventeen of 22 (77.2%) patients received complaints from teachers, usually because of the greater need to go to the bathroom; and 5.8% (1/17) because the student often missed class because of a medical follow-up (Table 3).

Twenty of the 22 eligible patients returned to the psychology clinic to carry out the school performance test (SPT) and Raven Matrices. Concerning the SPT, 5% (1/20) had outperformed the average; 40% (8/20) had average performance and 55% (11/20) had underperformed the overall average (Table 4). Considering Raven's Matrices, 60% (12/20) of the patients were intellectually at a medium level (Table 5).

The average quality of life score (QOL) was 71.0 ± 12.6 , and the lowest average among the four health dimension subscales was the school (54.8 ± 16.8) (Table 6). When stratifying the average quality of life according to the results of the school performance test (Table 4), we found lower average QoL scores in patients with medium level (68.5 ± 12.9) and lower level (70.4 ± 10.4). When QoL was evaluated in relation to the Raven's Matrices test, patients with average intellectual capacity, and below average had the worst results, 67.8 ± 11.9 and 65.2 ± 6.1 , respectively (Table 5).

DISCUSSION

This study describes a number of cases of children and adolescents with functional LUTS, followed at the Pediatric Nephrology Clinic of the IMIP. Since it was a series of cases, we did not perform the statistical

TABLE 2 ASPECTS OF THE RELATIONSHIP WITH THE PARENTS, WITH OTHER CHILDREN AND WITH THE SCHOOL OF THE CHILDREN AND ADOLESCENTS (5 TO 14 YEARS) WITH FUNCTIONAL LUTS, FOLLOWED IN THE PEDIATRIC NEPHROLOGY CLINIC OF THE IMIP DURING THE PERIOD OF SEPTEMBER OF 2013 AND MARCH OF 2014

Questions	Yes answers	
	n ()	%
Relationship of the parents with the child		
• Were you instructed by a physician or by another healthcare professional on when to wean the diaper from the child?	2 (22)	9.1
• When your child wets the clothes or bed, do you yell at him?	17 (20)*	85
• When your child wets his/her clothes or bed, do you hit them?	7 (20)*	35
• When your child wets his/her clothes or bed, do you submit him/her to embarrassing situations in order to teach him/her not to do it?	10 (20)*	50
• Has your child hidden wet clothes from you do you would not find out about it?	8 (20)*	40
• When your child "goes all the way"; pees and ends up wetting his/her clothes, do you think it is on purpose?	15 (20)*	75
• When your child "goes all the way"; pees and ends up wetting his/her clothes, do you think it is by laziness and on purpose?	18 (20)*	90
• When your child "goes all the way"; pees and ends up wetting his/her clothes, do you think he/she has some kind of medical problem?	3 (20)*	15
Child's relationship with other children		
• Do the other children know you wet your clothes?	10 (20)*	50
• Do the other children know you wet your bed?	6 (13)**	46.1
• Do you hide or has hidden your clothes from your classmates when you pee in your pants?	9 (20)*	45
• Do your classmates laugh at you when you pee in your pants?	5 (20)*	25
• Were you given any nickname for peeing your clothes or bed?	10 (20)*	50
• Do you like going to a friend's house?	5 (13)***	38.4
• Do you like sleeping over at a friend's house?	1 (9)***	11.1

*We disregarded the ones who had reduced micturition frequency for not having urinary losses. **Six patients of the thirteen who reported enuresis. *** Patients whose parents allowed them to visit and sleep at a friend's house.

significance test; however, we could confirm and highlight some profiles evidenced in the literature that elaborates on the topic.

The predominance of LUTS among female children were in accordance to that reported in the literature, but the relative frequency among males was much higher in our study than in others.^{3,12,13,15} Some LUTS symptoms may be related to incorrect toilet training, and it is assumed that, culturally, girls are taught to postpone urination in order to find an appropriate place, with good hygienic conditions.²⁸⁻³⁰ However, Chung *et al.*,³¹ in Korea, demonstrated a high prevalence of overactive bladder among school children from 5 to 13 years of age

(16.59%), with no difference between the genders, while another study in Sweden also showed no significant difference between boys and girls.²

The average age of the study group was higher than that reported in the literature, 8 to 12 years old were the children in the predominant age group, unlike other studies in which the average age was generally lower and showing that the symptoms become less frequent with the increase in age.^{10,12,13,15} Among girls, the peak prevalence of LUTS was 8.7% at seven years, gradually decreasing to 4% in adolescents; and among boys these rates were 1.4% and 0.9%, respectively.^{28,29}

TABLE 3 ASPECTS ASSOCIATED WITH THE RELATIONSHIP BETWEEN THE SCHOOL AND THE TEACHERS OF CHILDREN AND ADOLESCENTS (5 TO 14 YEARS OF AGE) WITH FUNCTIONAL LUTS FOLLOWED IN THE PEDIATRIC NEPHROLOGY CLINIC OF THE IMIP BETWEEN SEPTEMBER AND MARCH OF 2014

Child's relationship with the school	Always N%	Frequently N%	Sometimes N%	Rarely N%	Never N%
• Do you like going to school?	8 36.4	9 40.9	4 18.2	1 4.5	0 0
• Do you usually get complaints from the teachers?	3 13.6	4 18.2	10 45.5	1 4.5	4 18.2
• When you ask to go to the bathroom more frequently, does the teacher let you go?	4 18.2	4 18.2	9 40.9	4 18.2	1 4.5

TABLE 4 LEVELS OBTAINED FROM THE MATH, WRITING AND READING TESTS AND IN THE FINAL SPT SCORE AND MEAN OF THE QUALITY OF LIFE TOTAL SCORE FROM EACH GROUP OF CHILDREN FOLLOWED IN THE PEDIATRIC NEPHROLOGY CLINIC OF THE IMIP BETWEEN SEPTEMBER OF 2013 AND MARCH OF 2014

SPT results levels	READING n (%)	WRITING n (%)	MATH n (%)	SPTTOTAL* n (%)	Mean QoL total score \pm SD
Higher	6 (30)	1 (5)	2 (10)	1 (5)	77.1
Medium	5 (25)	8 (40)	6 (30)	8 (40)	68.5 \pm 12.9
Lower	9 (45)	11 (55)	12 (60)	11 (55)	70.4 \pm 10.4

TABLE 5 DISTRIBUTION OF THE FUNCTION LUTS CHILDREN FROM 5 TO 14 YEARS OF AGE FOLLOWED IN THE IMIPC PEDIATRICS NEPHROLOGY CLINIC BETWEEN SEPTEMBER OF 2013 AND MARCH OF 2014, ACCORDING TO THE LEVELS OBTAINED FROM THE RAVEN PROGRESSIVE MATRICES TEST: INTELLECTUALLY DEFICIENT, BELOW INTELLECTUAL CAPACITY AVERAGE, INTELLECTUALLY AVERAGE, ABOVE AVERAGE FOR INTELLECTUAL CAPACITY AND INTELLECTUALLY HIGHER

Matrices test	N*	%	QV Mean ET \pm SD
Below average for intellectual skills	2	10	65.2 \pm 6.1
Intellectually average	12	60	67.8 \pm 11.9
Above average for intellectual skills	4	20	77.8 \pm 4.9
Intellectually higher	2	10	72.2 \pm 17.7

TABLE 6 MEAN VALUE OF THE QUALITY OF LIFE SCORES OF PATIENTS BETWEEN 5 AND 14 YEARS OF AGE WITH FUNCTIONAL LUTS FOLLOWED IN THE PEDIATRIC NEPHROLOGY CLINIC OF IMIP BETWEEN SEPTEMBER OF 2013 AND MARCH OF 2014

	Aspects					Total score
	Physical	Social	Emocional	School-related	Psychosocia	
Patient with LUTS						
N =						22
Mean \pm DP	75.7 \pm 14.8	60.2 \pm 19.7	82.5 \pm 16.6	54.8 \pm 16.8	65.83 \pm 13.8	71 \pm 12.6

Most of the studied population belonged to social classes C and D, since the study was held in a hospital that caters exclusively for patients of the Public Healthcare System (SUS). A Brazilian study with children with functional LUTS⁴ and one Italian study involving patients with enuresis also demonstrated a higher prevalence of these symptoms in children of low socioeconomic status.³²

The most frequently reported LUTS symptoms were urge incontinence, holding maneuvers and enuresis, as per observed in other studies.^{4,5,12,17} In Sweden and Australia, urinary incontinence, holding maneuvers and dysuria were more frequent in girls and enuresis in boys.^{33,34} In Brazil, when analyzing the prevalence of isolated urinary symptoms, the most common were nocturia (60.4%), urinary urgency

(30.3%) and holding maneuvers (21.2%), all of which are more common in girls; although for nocturia there were no statistically significance difference.⁴

LUTS associated with gastrointestinal dysfunction (the elimination disorder syndrome) already described in other studies, was also present in most of our patients. We emphasize the importance of these symptoms, especially having seen that the treatment of the gastrointestinal disorder, in some cases, can improve functional LUTS and vice versa.³⁵⁻³⁷

As for the milestones in the development of bladder control in these patients, very few studies were found. Although there is the possibility of recall bias on the information collected, the average age of onset of perception of voiding desire and diaper weaning during daytime in our study was close to the one described in the Brazilian study from the city of Pelotas, where the average age of daytime sphincter control was 22.6 ± 11.2 months, and at 12 months, 15.1% of children had had daytime control at 18 months, 41.7% and up to 36 months for 97.6% of them.^{4,5}

Nighttime urination control among children in our study occurred later in the study mentioned above, in which nighttime control occurred on average at 24.4 ± 14.8 months. In the study of Pelotas, at 12 months 10.5% of the children had nocturnal control, 28.8% in up to 18 months, and 89.9% of them in up to 36 months.⁴

Regarding the weaning of diapers, only two caregivers reported having had a healthcare professional instructing them on the correct age to do it and how it should be done. In the study carried out in Pelotas, about 20% of households reported that pediatricians had instructed them on toilet training and the majority of mothers (60%) said they “did what they thought best”, “following what they already knew” or he had “learned during life”.⁴

Three of the caregivers believed that the symptoms were signs of a health problem and most parents justified the holding maneuvers, urgency, urge incontinence and bedwetting as something that occurs because of “laziness” or even “on purpose”, because the child does not want to go the bathroom not to be away from their playful activities, as per mentioned in other Brazilian^{4,5} and Belgium³⁷ studies. In Pernambuco, when parents of children with enuresis were evaluated, mostly did not see enuresis as a disease, leading to not coping with it or delaying

in seeking medical care, as well as a low engagement in treatment or following the recommendations of healthcare professionals.⁵ In a study in Turkey with children with enuresis, only 11.9% of parents had a history of visits to the doctor concerning the symptoms reported.³⁸

We developed a questionnaire to assess the reaction of caregivers in face of children with symptoms of urgency/urge incontinence/enuresis. Many caregivers reported having yelled and/or hit the child and/or that the child had been subjected to embarrassing situations from them or from other adults, in order to punish the child. These worrisome behaviors confirm again that these children, especially the enuretic ones are victims of domestic and school violence.³⁹ Many of these embarrassing situations reported were used to “teach” a child with urge incontinence and/or enuresis; and the most frequent were: have the children wash their wet clothes and expose the child’s problem to friends, family and neighbors.

A study carried out in Turkey with parents of children with enuresis showed higher levels of stress when compared with a control group who had healthy children, as well as the possibility of the child’s problem influencing the couple’s marital relationship.⁴⁰

In a study carried out in Rio de Janeiro to assess domestic violence against 132 children with enuresis, 89% suffered some kind of aggression due to episodes of urine leakage. All cases presented verbal punishment with or without other types of aggression. Physical punishment without contact occurred in 50.8% of cases, and with contact in 48.5%. The main aggressor was the mother (87.9%), and, in one case, there was severe genital injury that required reconstructive surgery.³⁹

Assessing the relationship of the children with the school, many said they did not like to go to school and received complaints related to more frequent trips to the bathroom. Relationship problems in schools were also reported in several studies - these patients being more susceptible to behavioral disorders. In Germany, von Gontard *et al.*⁴¹ reported that children with the habit of postponing urination had twice more behavioral problems than children who did not. Among the carriers of urinary incontinence, these problems were seen three to four times more often.

A study carried out in the United States showed that children with urinary tract symptoms had higher

scores in the questionnaire for evaluation of bullying victims, the *Bullied Index Score*.⁴² There were also reports of teachers involved in embarrassing behaviors - as the example we mentioned in the case where the patient was forced to clean the classroom floor and the other children were encouraged to laugh at the situation.

Regarding quality of life, in our study there was no comparison with a control group to assess whether there were differences related to LUTS. A study carried out in Slovenia involving children with enuresis showed no difference in QoL; however, they reported a negative influence on their relationships with friends; these children often tried to hide their urinary disorder, some expressed their grief with low self-esteem, and had worse school performance.⁴³ A study by Lopes *et al.*,⁴⁴ using the *Autoquestionnaire Qualité de Vie Enfant Imagé* (AUQUEI) showed low quality of life scores in the group of patients with LUTS and problems in dealing with social aspects, such as being in the classroom, as well as manifestation of negative aspects in relation to urinary losses.

In relation to school performance, in accordance with the SPT applied, most children were in the lower level. As our study aimed at doing a case study, we cannot state a relationship between LUTS and worse school performance; furthermore, the sample was from a population with low socioeconomic level and admittedly low quality of public education. A study carried out in Belo Horizonte, in 2013, found that, in general, the performance of private school participants was higher than those students from public schools.⁴⁵

It is also interesting to note that in our study, poor school performance occurred in a group where the majority was classified as having average intelligence, which leads us to challenge whether the LUTS is related to worse learning. A study conducted in São Paulo pointed out that, comparatively, enuretic children tend to have more language problems than their non-enuretic counterparts, especially speech disorders as the omission of phonemes r/e {R}; and, in general they are quieter,⁴⁶ it can also be associated to the school performance difficulties found in our study. In a recently conducted study, the authors showed a correlation between LUTS and attention deficit and hyperactivity disorder, which can also explain low school performance in these patients.^{47,48}

Regarding quality of life, there was no control group for comparison and we emphasize that in this assessment the school aspect yielded the worst score. Evaluating QoL and SPT, and QoL and the Raven matrices, groups with lower school performance and lower cognitive levels were also related to lower QoL scores. It should be remembered that the sample derived from the population with low income and LUTS certainly would not be the only factor justifying the lower school performance with average cognitive levels. There are social conditions and issues related to the low quality of public education in the country,⁴⁵ further studies are needed to evaluate this relationship.

CONCLUSION

LUTS seems to be a factor that can negatively influence aspects of the carrier's daily life, particularly those related to social networks in family and school lives. Therefore, we need a broad approach to the patient, and these children require multidisciplinary monitoring with management not only of the disorder, but also involving psychosocial aspects.

Adults who live with these children, especially teachers, caregivers and healthcare professionals should have access to the information obtained from this and other studies, so that they are aware of what LUTS is and make the diagnosis and early treatment of this children in an expedited manner, preventing them from going through so many difficult and embarrassing situations that are already part of an ancient culture to condemn them and punish them for something that is a symptom of having trouble to control urination, thus reducing the negative impact of this disorder in the lives of their carriers.

We also emphasize that further studies should be carried out, with a larger number of participants in the sample and in other populations so that some biases such as the low quality of public education, and low socioeconomic status do not influence the study results.

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