

A comparison of dysfunctional voiding scores between patients with nocturnal enuresis and healthy children

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Background/aim: To compare dysfunctional voiding symptom scores (DVSSs) between enuretic children and nonenuretic controls and to investigate associated factors that may affect DVSS.

Materials and methods: A questionnaire including demographic features, educational status of parents, DVSS questions, and urinary tract infection (UTI) history was designed. A total of 269 patients were included; Group 1 comprised 161 patients with no voiding symptoms and Group 2 comprised 108 patients with nocturnal enuresis (NE). Children with DVSS of greater than 8.5 were suspected to have dysfunctional voiding. The results were evaluated using SPSS 15.0 with Kruskal–Wallis and multivariate logistic regression tests.

Results: The median DVSS was 2 (interquartile range [IQR]: 1–3) in Group 1 and 8 (IQR: 5–12) in Group 2. The percentage of children with DVSS greater than 8.5 was 0.6% in Group 1 and 53.1% in Group 2 ($P = 0.01$). The percentage of children with UTI history was significantly higher in Group 2 (34.3%) than Group 1 (15.9%) ($P = 0.03$). An increase in the educational level of the father decreased DVSS by 0.5-fold. Presence of UTI history increased DVSS 2.5-fold.

Conclusion: The DVSS is a rapid, easy tool for determining abnormal voiding parameters in children. Children with NE had higher DVSSs, which was significantly affected by the father's educational status and the child's UTI history.

Key words: Childhood, dysfunctional voiding, dysfunctional voiding symptom score, enuresis, nocturnal enuresis

1. Introduction

Nocturnal enuresis (NE) is a common social problem causing shame and embarrassment for patients. It affects not only the child's social life but also the family's social and behavioral attitudes (1). The prevalence of NE differs according to region and country. The prevalence in Turkey was reported between 9.8% and 15% in several studies (2,3). Therefore, awareness about clinical features and management methods of such an important common social problem is vital for social health.

NE is defined as urinary incontinence at night (4,5). There are several classifications for the clinical presentation of incontinence symptoms (4,6). Some classifications are based on urodynamic parameters (urge syndrome, lazy bladder, dysfunctional voiding), while others are based on clinical presentations (4,5). Besides the classifications, coexistence of voiding dysfunction with NE is also a common issue (6).

For a successful treatment of enuresis, it is important to differentiate between bedwetting only at night, nocturnal bedwetting with diurnal symptoms, and isolated daytime

incontinence (4–6). The treatment of enuresis associated with dysfunctional voiding is usually impossible without managing any voiding abnormalities. The diagnosis of dysfunctional voiding relies on a detailed history that is based mainly on parental reporting, physical examination, and urine analysis (6,7). Evaluation with noninvasive tools, such as questionnaires, urine analysis, or uroflowmetry, is useful in diagnosis, treatment planning, and evaluating the response to treatment during the follow-up period (8). The dysfunctional voiding symptom score (DVSS) is used in children to evaluate abnormal voiding patterns quantitatively (6). The DVSS was validated for Turkey and has been widely used in the evaluation of voiding patterns of enuretic patients. The DVSS is not only an investigation method for diagnosis; it also provides an objective evaluation of incontinence symptoms without using invasive diagnostic tools (6). However, factors that might affect the DVSS and its use in routine clinical practice have not been well defined so far.

The aim of the present study was to compare DVSSs between enuretic and nonenuretic children and to

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investigate the associated factors affecting the DVSS by using a brief parental questionnaire.

2. Materials and methods

The study was conducted in compliance with the Declaration of Helsinki and was approved by the Ethics Committee of Kırıkkale University (2012–12/05). The study is a questionnaire-based prospective study and lasted for 1 year. A questionnaire was designed and administered to the patients consecutively admitted to our outpatient clinic. Patients with NE and those without any voiding symptoms were included in the study. The included patients were between 5 and 11 years old. Any patients having a known neurological or spinal cord disease were excluded from the study. The patients who were already being followed up with after a previous diagnosis of dysfunctional voiding were also excluded.

The questionnaire was designed to include demographic features of the patients, educational status of the parents, number of siblings, history of urinary tract infections (UTIs), and DVSS questions validated for use among Turkish children by Akbal et al. (6) (see Appendix on the journal's website). Patients were allocated into 2 groups: Group 1 included the patients with no voiding symptoms (n = 161) and Group 2 included the patients with NE (n = 108).

The parents of the children were surveyed using the questionnaire during a face-to-face interview. The educational level of the parents was defined as low (primary school graduates and middle school graduates) or high (high school graduates and university graduates). The responses of the families regarding UTIs were confirmed by urinary culture results. Children with a DVSS of greater than 8.5, the cut-off value given in previous studies (6), were suspected of having dysfunctional voiding.

First, the results from the questionnaire were evaluated. Next, the relationship between the parameters in the questionnaire and the measured DVSS was evaluated statistically for the enuretic group. For statistical analysis, SPSS 15.0 was used. The comparison between groups was evaluated with the Kruskal–Wallis test, and the effect of other parameters on the DVSS was evaluated using the multivariate logistic regression test. $P < 0.05$ was considered as statistically significant.

3. Results

The age range was 5 to 11 years (median: 7) in Group 1 and 5 to 11 years (median: 8) in Group 2. The female/male ratio was 75/86 (female: 46.6%, male: 53.4%) in Group 1 and 50/61 (female: 45%, male: 55%) in Group 2. The educational level of mothers and fathers was significantly higher in Group 1 when compared to Group 2 (mothers and fathers with university education: 34% and 57.3% in Group 1, 17.9% and 34.3% in Group 2, respectively; $P = 0.01$ and $P = 0.01$). The comparison of demographic features of children with NE (n = 108) and healthy subjects (n = 161) is shown in Table 1. The number of siblings was significantly higher in Group 2 compared to Group 1 ($P = 0.04$). Toilet training after 5 years of age was seen in 1.2% (n = 2) of patients in Group 1 and in 3.6% (n = 4) of patients in Group 2 ($P = 0.21$). UTI history was significantly higher in Group 2 (34.3%) than in Group 1 (15.9%) ($P = 0.03$). While only 5.6% of children in Group 1 experienced a UTI more than once, 25.2% of children in Group 2 had UTIs more than once ($P = 0.03$) (Figure).

The median DVSS was 2 (range: 1–3) in Group 1 and 8 (range: 5–12) in Group 2 ($P = 0.001$). The percentage of children with DVSSs of greater than 8.5 was 0.6% in Group 1 and 53.1% in Group 2 ($P = 0.01$).

Table 1. The demographic features of the enuretic and nonenuretic subjects.

	Group 1 Control (n = 161)	Group 2 NE (n = 108)	P-value
Median age	7 (5–11)	8 (5–11)	0.25
Sex (F : M)	75 : 86	50 : 61	0.42
Mothers with high education rate	54 (34%)	19 (17.9%)	0.01
Fathers with high education rate	92 (57.3%)	37 (34.3%)	0.01
Median number of siblings	1 (IQR: 0–1)	2 (IQR: 0–1)	0.04
Toilet training time (>5 years)	2 (1.2%)	4 (3.6%)	0.21
History of UTIs	25 (15.9%)	37 (34.3%)	0.03
History of UTIs >1 time	9 (5.6%)	28 (25.2%)	0.03
DVSS	2 (IQR: 1–3)	8 (IQR: 5–12)	0.001
DVSS of >8.5	1 (0.6%)	58 (53.1%)	0.01

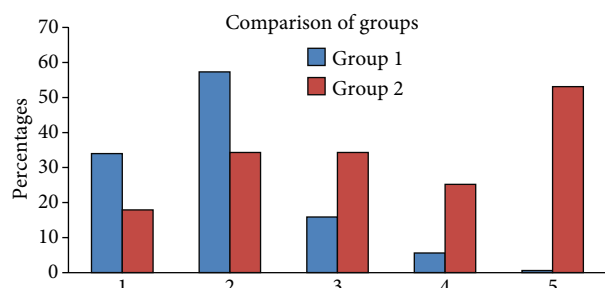


Figure. The comparison of the groups for statistically significant parameters (parameters: 1: mother's education level, 2: father's education level, 3: history of UTI, 4: UTIs more than once, 5: DVSS of more than 8.5).

The effects of the investigated parameters on DVSS were evaluated with the multivariate logistic regression test. We found that higher educational level of fathers decreased the DVSS by 0.5-fold ($P = 0.046$; odds ratio: 0.481), whereas a history of UTI increased scores 2.5-fold ($P = 0.01$; odds ratio: 2.580) (Table 2). The educational level of the mother, number of siblings, age, and sex did not affect the DVSS.

4. Discussion

Since urinary incontinence is a common problem, it has been a popular focus of many studies. The most controversial point is the terminology and differential diagnosis. The International Children's Continence Society has standardized the terminology and management of this common problem (4,9). The symptom of involuntary urine loss is termed as urinary incontinence. Urinary incontinence occurring at night is designated as enuresis or NE (1), while that experienced during the day is referred to as daytime incontinence or diurnal enuresis (4).

Since the management differs according to the appropriate diagnosis, it is important to differentiate between bedwetting only at night, nocturnal bedwetting

with diurnal symptoms, and isolated daytime incontinence (4–6). The first tool for assessment is a detailed history that is based mainly on parental reporting and physical examination (4,6,7). In order to prevent unnecessary invasive diagnostic tests, symptom scoring tests have been defined to evaluate abnormal voiding patterns quantitatively (6,10–12).

In the present study, we used the DVSS that was validated for Turkish children by Akbal et al. (6). We prepared a questionnaire including the DVSS items, as well as some other questions regarding the demographic features of the cases. The families wished to complete the questionnaires during a face-to-face interview. We suggest that face-to-face interview is a better means of surveying with less bias.

There have been several studies revealing the prevalence and associated factors of diurnal enuresis and symptom scoring systems. However, to the best of our knowledge, the effect of these associated factors on the symptom scores has not been evaluated previously. In the present study, the educational level of the parents was found to be significantly higher in healthy subjects than in the children with NE. The number of family members was also significantly higher in enuretic children compared to healthy children. UTIs were seen more commonly in enuretic children. Toktamış et al. also revealed that UTIs were more common in cases of diurnal enuresis (13). That study also revealed that delayed toilet training was more prevalent in patients with diurnal enuresis; however, we could not determine such a relationship in our study. In the former study, the investigators were unable to show a relation between diurnal enuresis and the educational level of the parents or family size.

Dysfunctional voiding and NE are frequently seen together (5,6,14). Akbal et al. showed that there is a significant difference in symptom scores in children with enuresis (6). In the present study, DVSS was found to be higher in children with enuresis compared to healthy children. Furthermore, there were significantly more

Table 2. The factors affecting DVSS (logistic regression analysis).

NE (n = 108)	One variant			Multivariate		
	Odds ratio	95% CI	P-value	Odds ratio	95% CI	P-value
Median age	0.912	0.487–1.707	0.772	-	-	-
Sex (M : F)	1.034	0.566–1.889	0.913	-	-	-
Mothers with high education rate	0.536	0.245–1.169	0.117	-	-	-
Fathers with high education rate	0.477	0.247–0.921	0.027	0.481	0.235–0.986	0.046
Number of siblings	1.681	1.032–2.737	0.037	-	-	-
Toilet training time (>5 years)	1.455	0.814–2.601	0.205	-	-	-
History of UTIs	2.954	1.537–5.677	0.001	2.580	1.248–5.334	0.01

cases with DVSS of higher than 8.5 in the children with enuresis. Using only the guidance of DVSS results, it was not possible to draw a firm conclusion that children with NE have dysfunctional voiding. However, we suggest that the DVSS can be used to survey the dysfunctional voiding symptoms in children, and it may prevent further invasive urologic investigations in children with lower scores.

We also evaluated the effect of some other factors on DVSSs in patients with enuresis. The DVSS decreased 0.5-fold as the education level of the father increased. However, the educational level of the mother had no effect on DVSS according to our results. In our study, the educational level of mothers was similar in both groups. Therefore, we found that there was no correlation between educational status of mothers and DVSS score. However, since the incidence of higher education was higher in fathers in the healthy group, we found that the father's educational status was inversely correlated with DVSS. DVSS was also increased 2.5 times as the number of UTI episodes increased. In contrast, the number of siblings, age, and sex did not affect the DVSS according to our results. Schast et al. evaluated patients with lower urinary tract symptoms (12). They revealed that results of multivariate analysis were significant with respect to child and family quality of life. However, they

did not examine the effect of demographic features on the symptom score. Therefore, our study is unique since demographic features and the parents' educational status were surveyed as factors affecting the DVSS. The most important limitation of our study is that the data were obtained from a questionnaire. In addition, the results cannot be accepted as reflecting clinical findings, since it was shown in a previous study that parents underreport some symptoms by a rate of 20%–25% (7) and since significant discrepancies have been detected between questionnaires and the patient's bladder diary (15). Thus, we suggest that randomized clinical studies are required to compare parents' reports with objective clinical data.

In conclusion, the DVSS is a rapid and easy tool to determine abnormal voiding parameters in children, and it can be used to survey the dysfunction voiding symptoms in children with NE. Children with NE had a higher DVSS than healthy children, and the DVSS was shown to be significantly affected by the educational status of the fathers and the child's history of UTIs.

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Appendix. The questionnaire, including demographic features (Part 1) and dysfunctional voiding and incontinence symptom score (DVSS; Part 2).

PART 1

Patient number:

Age & sex:

Mother's education level

Father's education level

Number of siblings

Toilet training time

Has your child ever had a urinary tract infection?

If YES for previous question: how many times so far?

PART 2

DVSS

Does your child wet himself during the day?	No 0	Sometimes 1	1-2 times/day 3	Always 5
How wet is your child during the day?	Damp underwear 1	Damp pants only 3	Pants soaking wet 5	
Does your child wet himself during the night?	No 0	1-2 nights/week 1	3-5 nights/week 3	6-7 nights/week 5
How wet is your child during the night?	Damp bed sheet only 1	Bed sheets soaking wet 4		
How many times does your child void?	Less than 7/day 0	7 or more than /day 1		
Straining during voiding?	No 0	Yes 4		
Pain during voiding?	No 0	Yes 1		
Voiding intermittently?	No 0	Yes 2		
Needs to go back to voiding soon after finishes urinating?	No 0	Yes 2		
Sudden feeling of having to urinate immediately?	No 0	Yes 1		
Holds by crossing legs?	No 0	Yes 2		
Wets on the way to the toilet?	No 0	Yes 2		
Misses bowel movements every day?	No 0	Yes 1		
If your child experiences the symptoms mentioned above, does it affect family, social, or school life?	No 0	Sometimes 1	Yes 2	Seriously affects 3