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Reliability and validity of the Bladder and Bowel Dysfunction Questionnaire among Turkish children

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Background/aim: We developed a Turkish version of the Bladder and Bowel Dysfunction Questionnaire (BBDQ) and evaluated its psychometric properties among Turkish pediatric patients.

Materials and methods: The BBDQ was translated into Turkish and then it was back-translated into English. A total of 193 patients were asked to complete the Turkish version of the BBDQ as well as the Dysfunctional Voiding and Incontinence Scoring System (DVISS). In addition, 39 children completed the same questionnaires twice at 2-week intervals for test–retest evaluation.

Results: Cronbach's alpha coefficient of the BBDQ was 0.727. Reliability of the test/retest was 0.759 ($P < 0.001$). Area under the curve of the receiver operating characteristic plot was 0.765. There were statistically significant differences in BBDQ scores between the controls and patients ($P < 0.001$). Analysis demonstrated moderate convergent validity against the DVISS (r: 0.78, r^2: 0.601, $P < 0.0001$).

Conclusion: The Turkish version of the BBDQ is a reliable and valid instrument for Turkish pediatric patients with bladder and bowel dysfunction in clinical and research settings.

Key words: Bladder bowel dysfunction, pediatric urology, questionnaire, Turkish validation

1. Introduction

Bladder bowel dysfunction (BBD) is common clinical problem in pediatric urology patients. If a specialist takes a medical history meticulously during ambulatory visits by these patients, it can be detected just about 40% (1).

These patients present with lower urinary tract symptoms (LUTS) of storage and/or emptying. When this disorder is associated with abnormal bowel patterns such as constipation and encopresis, the term bladder bowel dysfunction (BBD) is used. BBD can lead to development of urinary tract infection (UTI), incontinence, unfavorable outcome on vesicourethral reflux (VUR), and upper or lower urinary tract damage in children. Regarding the sex distribution of this problem, a female to male ratio as high as 5:1 for BBD is reported in the literature (2). However, the epidemiological data about this problem can vary, depending on the definition of BBD.

Diagnostic procedures should include taking a medical history, physical examination, voiding and bowel diary, urinalysis, urine culture, urinary ultrasonography, and complementary investigations. In contrast, there is no consensus about reliable and valid methods for evaluation of this problem. There are a few published questionnaires that quantify BBD. Additionally, the International Continence Society (ICS) recommends the use of the Rome III criteria for constipation in children. Extensively, the Bristol Stool Form Scale (BSFS) is used for definition of constipation. Recently, new diagnostic methods were developed for the diagnosis and follow up of dysfunctional micturition symptoms. One of them is named the Bladder and Bowel Dysfunction Questionnaire (BBDQ).

In this context, we aimed to evaluate the reliability and validity of a Turkish version of the BBDQ in pediatric urology patients.

2. Patients and methods

2.1. Study design

Between October 2013 and April 2014, a total of 193 consecutive male (n = 94) and female (n = 99) children were enrolled in this study. While 103 patients with various

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lower urinary tract symptoms (47 boys and 56 girls) constituted the study group, the remaining 90 children without any lower urinary tract problems (47 boys and 43 girls) comprised the control group. While children >4 years old with established micturition problems and/or incontinence despite completion of toilet training were included in the study, children with a history of mental, psychiatric, or neurologic as well as urinary stone diseases, active urinary infection, previous history of urological procedures, congenital urogenital anomalies, and receiving medication with drugs that may interfere with lower urinary tract function were excluded from the study. Additionally, children whose parents were not able to read and write Turkish were also excluded.

The study was approved by the Ethics Committee of our hospital and conducted in accordance with the Declaration of Helsinki (193/2013). In this study, all participants' parents gave signed informed consent.

After obtaining a detailed medical history, a thorough physical examination was performed and urinalysis, urine culture-antibiogram tests, a voiding diary (3 days), uroflowmetry, and urinary ultrasonography were performed in all cases evaluated in the study group. The Turkish version of the BBDQ was well completed by the children with the support of their parents. Due to the lack of a validated Turkish version of the BBDQ at the beginning of the trial, a version translated into Turkish was used. This questionnaire includes 13 specific questions and 1 general question in the form of a 5-point Likert scale questionnaire (3). Scores range from 0 to 52 and a total score of greater than or equal to 11 is accepted as indicative for the diagnosis of BBD. Families were well informed and requested to complete the questionnaire for their toilet-trained children. Additionally, all participants were asked to complete a Dysfunctional Voiding and Incontinence Symptoms Score (DVISS) Questionnaire, which has already been proven as statistically reliable and valid for the Turkish population (4).

In order to assess reproducibility, the scale was applied to 39 participants (study and control cases) twice with 2-week intervals for test–retest correlation. The internal consistency of the scale was evaluated by Cronbach's α coefficient for 154 participants in the study and control groups.

2.2. Translation process and pilot study

Linguistic validation of the BBDQ was performed through a standard, multistep process as recommended by Hutchinson et al. (5).

The linguistic validation process consisted of the following steps:

1. The questionnaire was initially translated from English to Turkish by two independent translators who were capable of fluent English and Turkish without any familiarity with the BBDQ prior to the translation.

2. A first consensus meeting involving the two translators and the research group was held to evaluate the Turkish versions in a comparative manner and the first consensus on the Turkish version was established.

3. Back-translation of the accepted consensus version was performed simultaneously by two independent translators with a capability of fluent English and Turkish, without referring to the original questionnaire.

4. A second consensus meeting was held between the translators and all investigators, during which the original and back-translated versions were compared and their minor discordances were debated. A further revision of the first consensus version of the questionnaire was then made and the final definitive version was edited and drafted.

5. Finally, a pilot test was performed to assess whether the questionnaire was clear and appropriate by face-to-face interviews in 5 male and 5 female symptomatic children with their parents. Following the realization that no difficulty was present in the completion of the final Turkish form of the questionnaire, the final Turkish version of the BBDQ was approved by the clinical team without any further changes (Appendix).

2.3 Statistical analysis

The data were presented as mean ± SEM. The characteristics of the participants were analyzed using descriptive statistics. Psychometric analyses of the BBDQ were carried out by the following procedures. Reliability was evaluated by internal consistency and test–retest reliability. Internal consistency was evaluated with Cronbach's alpha. Test–retest reliability was also evaluated with Spearman correlation. Moreover, test–retest scores were compared through Wilcoxon's signed rank test. Convergent validity was assessed by correlating the scores of the DVISS questionnaire by Spearman test. Discriminant validity was evaluated by comparing the results of study cases with those of controls. The Mann-Whitney U test was employed to investigate mean differences between study cases and controls. The content validity, which indicates whether the questionnaire makes sense to the patients and experts and whether all the important and relevant domains are included, was assessed by an expert panel. Receiver operating characteristic (ROC) plots were used to define the detection cut-off or threshold score best reflecting optimal sensitivity and specificity. All statistical analyses were performed using SPSS version 11.0 (IBM, USA) and were two-sided with $P < 0.05$ defined as statistically significant.

3. Results

In our study, 48 patients were diagnosed with nocturnal enuresis (46.6%), 4 patients with vesicourethral reflux (VUR) (0.04%), and 51 patients with overactive bladder (OAB) (49.5%).

The mean age of the participants was 103.11 ± 31.72 months (49–195 months). Cronbach's α coefficient of the BBDQ was 0.727. The test–retest scores applied with 2-week intervals in between showed a correlation (r^2: 0.759 and P: 0.01). There was no difference between the test and retest BBDQ scores (P: 0.517) (Table).

The convergent validity of the Turkish version of BBDQ was further confirmed as a result of the correlations with another validated questionnaire, the DVISS (r: 0.78, r^2: 0.601, P <0.0001)

Total BBDQ scores for the study and control groups were 17.00 ± 0.82 and 9.69 ± 0.64, respectively (P < 0.001). Total DVISS scores for the study and control groups were 12.28 ± 0.75 and 4.09 ± 0.54, respectively (P < 0.001).

ROC plots were used to define the threshold score in an attempt to reflect the optimal sensitivity and specificity in a simultaneous manner (Figure). Area under the ROC curve by the trapezoidal rule was 0.77 and the optimal threshold score was 11 (sensitivity 66% and specificity 69%) for the BDDQ. Although the value was lower than the DVISS value of 0.83, it was regarded as meaningful on this aspect.

4. Discussion

With a heterogeneous spectrum of symptomatology, BBD may consist of abnormal lower urinary tract symptoms of storage and/or emptying (such as voiding postponement, urgency, frequency, and daytime or nighttime incontinence symptoms) and abnormal bowel patterns (such as constipation and encopresis) (6). Children presenting with BBD are more prone to UTI, urinary incontinence, and VUR (7,8). Although it was named dysfunctional elimination syndrome (DES) in the past, this pathology is now referred to as BBD (9,10).

The genitourinary and gastrointestinal tracts originate from the same common embryological origin, where the close anatomical location of the bladder/urethra to the rectum may well explain this correlative pathophysiology. Normally, there is a functional interaction between bowel and bladder (11). Chase and Burges et al. have proposed that rectal distension (constipation) pushes the posterior bladder wall and causes bladder overactivity due to trigonal irritation or bladder neck/urethra obstruction (12,13). Increased stool mass in the rectum may affect bladder capacity and cause chronic pelvic spasms, which

Table. Reliability results of the BBDQ with DVISS.

	Cronbach's alpha	Reliability of the test/retest	
		r	P
BBDQ	0.727	0.759	0.01
DVISS	0.808	0.841	0.01

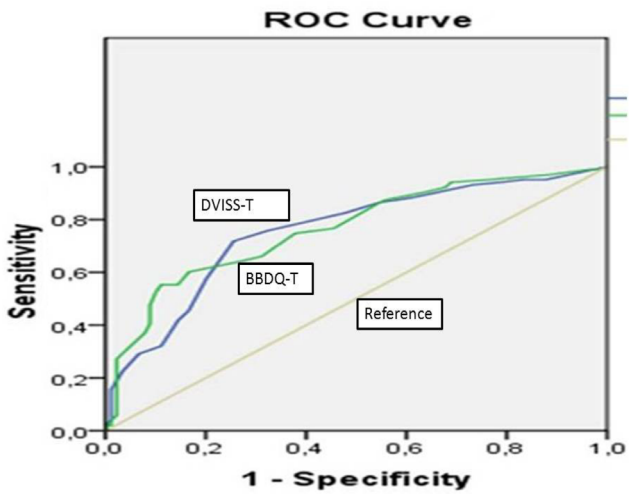

Figure. Area under ROC curve was estimated for the Turkish versions of the BBDQ and DVISS.

may result in incomplete bladder emptying and increased volumes of postvoid residual urine. Voluntary holding of the urine for longer periods by children may cause a decreased sensation and urge to evacuate like symptoms of BBD. For this reason, treatment of BBD has to be focused on bowel habits and prevention of constipation.

Generally, the diagnosis of BBD is based on exclusion of all neurological and anatomical abnormalities. Urinary incontinence is often stressful for children and usually causes embarrassment, social isolation, and lack of self-esteem. Recently, the pediatric urology community has worked to develop questionnaires that might help to quantify BBD symptoms in a reliable and accurate manner. The BBD spectrum is classified by the International Children's Continence Society (ICCS) (9,14). A validated bladder/bowel dysfunction questionnaire is a useful tool in the pediatric urology clinical setting. Scoring systems should include questions about the storage/emptying phases of micturition and bowel functions. A BBD questionnaire was developed to evaluate bowel and bladder dysfunctions and it was validated as well as published in 2009 (3). Drzewiecki et al. found that this questionnaire was reliable in the detection and evaluation of responsiveness to treatment of BBD in these children (4). They found that scores of the BBD-related diseases were higher than BBD-unrelated scores. They suggested that a total score of 11 was associated with 80% sensitivity and 91% specificity (4).

In the present study we aimed to validate the Turkish translation of the BBDQ for clinical use. Psychometric properties of our validation study demonstrate that the Turkish version of the BBDQ is a reliable and valid instrument for measuring the BBD symptom complex in the pediatric population where the results obtained in our study seemed to be consistent with the study comparing the English version of the BBDQ. These findings demonstrate that this questionnaire has adequate levels of cross-cultural validity and might be applicable to other languages and cultures as well. Test–retest reliability showed a good correlation coefficient.

The Turkish version of the BBDQ showed a good correlation with other validated questionnaires. Moreover, convergent validity of the Turkish version of BBDQ was confirmed by good correlations with other validated questionnaires. Despite a lower statistical significance when compared with DVISS, we found that the reliability and validity of the Turkish version of the BBDQ were adequate. There was a statistically significant difference between the scores of the patients considered to have dysfunctional voiding and those considered to void normally.

Our study is the first translation into a foreign language of the BBDQ from the original English version. Potential limitations in our study were the nonhomogeneous study group and no specific survey for evaluation of constipation. We found the optimum threshold score was 11 (sensitivity 66% and specificity 69%) for the BDDQ. Although this score was in accordance with the literature data reported, the sensitivity and specificity scores obtained in our trial were lower than those in previous studies published in the literature.

Farhat et al. described statistically validated symptom scoring (DVSS- Dysfunctional Voiding Symptom Score) for wetting and functional disorders in children consisting of 10 questions based on the International-Prostate Symptom Score (I-PSS) (15). The DVSS has been used widely and translated into other languages (16–18). However, the drawbacks of this questionnaire were the lack of test–retest reliability and confusing wording of some of the questions asked (3,4). Sureshkumar et al. reported another pediatric daytime urinary incontinence questionnaire to assess the prevalence as well as the risk factors for daytime urinary incontinence in children from 3.5 to 7 years of age (19). It included excellent test–retest reliable questions except about bowel habits but its discriminative properties were not adequate to make a differentiation between normal and abnormal voiding patterns.

Last but not least, another pediatric bladder dysfunction questionnaire was developed in Turkey that has not been psychometrically validated (5). Akbal et al. suggested that this questionnaire was useful for diagnosis and follow up in the treatment of voiding dysfunction. However, the drawback of this questionnaire seems to be the lack of evaluation of constipation specifically, which may have certain effects on the interpretation of BBD as a whole (5). Additionally the validation of the cases from the psychometrical aspect with the DVISS questionnaire in BBD patients is the most important characteristic of our current study to be reported in the literature for the first time.

In the light of our current findings and the literature data published so far, we may claim that the Turkish version of the BBDQ is a reliable and valid instrument that can be easily administered for Turkish pediatric patients with BBD in both the clinical and research settings. However, we think that further clinical studies regarding the use of the Turkish version of the questionnaire among Turkish children would be useful to provide data that may in turn help us to increase the sensitivity of the test.

References

1. Rushton HG. Wetting and functional voiding disorders. Urol Clin North Am 1995; 22: 75-93.
2. Chen JJ, Mao W, Homayoon K, Steinhardt GF. A multivariate analysis of dysfunctional elimination syndrome and its relationships with gender, urinary tract infection and vesiciureteral reflux in children. J Urol 2004; 171: 1907-1910.
3. Drzewiecki BA, Thomas JC, Pope JC, Adams MC, Brock JW, Tanaka ST. Use of Validated Bladder/Bowel Dysfunction Questionnaire in the Clinical Pediatric Urology Setting. J Urol 2012; 188: 1578-1583.
4. Akbal C, Genc Y, Burgu B, Ozden E, Tekgul S. Dysfunctional voiding and incontinence scoring system: quantitative evaluation of incontinence symptoms in pediatric population. J Urol 2005; 173: 969-973.
5. Hutchinson A, Bentzen N, König-Zahn C. Cross-Cultural Health Outcome Assessment: A User's Guide. Editor: Ruinen. European Research Group on Health Outcomes (ERGHO) 1996, pp. 1-184.
6. Sillen U, Brandstom P, Jodal U, Holmdahl G, Sandin A, Sjöberg I, Hansson S. The Swedish Reflux Trial in Children: V. Bladder dysfunction. J Urol 2010; 184: 298-304.
7. Koff SA, Wagner TT, Jayanthi VR. The relationship among dysfunctional elimination syndromes, primary vesicoureteral reflux and urinary tract infections in children. J Urol 1998; 160: 1019-1022.
8. Neveus T, Von Gontard A, Hoebeke P, Hjälmås K, Bauer S, Bower W, Jørgensen TM, Rittig S, Walle JV, Yeung CK, et al. The standardization of terminology of lower urinary tract function in children and adolescents: Report from the Standardization Committee of the International Children's Continence Society. J Urol 2006; 176: 314-324.
9. Snodgrass W. Relationship of voiding dysfunction to urinary tract infection and vesicoureteral reflux in children. Urology 1991; 38: 341-344.
10. Austin PF, Bauer SB, Bower W, Chase J, Franco I, Hoebeke P, Rittig S, Vande Walle J, von Gontard A, Wright A, et al. The standardization of terminology of lower urinary tract function in children and adolescents: Update report from the Standardization Committee of the International Children's Continence Society. J Urol 2014; 191: 1863-1865.
11. Chase JW, Homsy Y, Siggaard C, Sit F, Bower WF. Functional constipation in children. J Urol 2004; 171: 2641-2643.
12. Burgers R, Liem O, Canon S, Mousa H, Benninga MA, Di Lorenzo C, Koff SA. Effect of rectal distention on lower urinary tract function in children. J Urol 2010; 184: 1680-1685.
13. Burgers RE, Mugie SM, Chase J, Cooper CS, von Gontard A, Rittig CS, Homsy Y, Bauer SB, Benninga MA. Management of functional constipation in children with lower urinary tract symptoms: report from the Standardization Committee of the International Children's Continence Society. J Urol 2013; 190: 29-36.
14. Afshar K, Mirbagheri A, Scott H, MacNeily AE. Development of a symptom score for dysfunctional elimination syndrome. J Urol 2009; 182: 1939-1943.
15. Farhat W, Bagli DJ, Capolicchio G, O'Reilly S, Merguerian PA, Khoury A, McLorie GA. The dysfunctional voiding scoring system: quantitative standardization of dysfunctional voiding symptoms in children. J Urol 2000; 164: 1011-1015.
16. Upadhyay J, Bolduc S, Bagli DJ, McLorie GA, Khoury AE, Farhat W. Use of the dysfunctional voiding symptom score to predict resolution of vesicoureteral reflux in children with voiding dysfunction. J Urol 2003; 169: 1842-1846.
17. Bartkowski DP, Doubrava RG. Ability of a normal dysfunctional voiding symptom score to predict uroflowmetry and external urinary sphincter electromyography patterns in children. J Urol 2004; 172: 1980-1985.
18. Calado AA, Araujo EM, Barraso U Jr, Netto JM, Filho MZ, Macedo A Jr, Bagli D, Farhat W. Cross cultural adaptation of the Dysfunctional Voiding Symptom Score (DVSS) questionnaire for Brazilian children. Int Braz J Urol 2010; 36: 458-463.
19. Sureshkumar P, Craig JC, Roy LP, Knight JF. A reproducible pediatric daytime urinary incontinence questionnaire. J Urol 2001; 165: 569-573.

Appendix. Turkish version of the BBDQ.

Mesane ve Barsak Günlük Sorgulaması (BBDQ)

Not: Bu sorgulama formu sizin **son bir ay içindeki** işeme/barsak şikayetlerinizi sorgulamayı amaçlamaktadır. Lütfen soruları son bir ayda ki durumunuzu göz önünde bulundurarak cevaplayınız.

Eğer tuvalet eğitiminiz yoksa burayı işaretleyiniz ☐

1. Gün içinde iç çamaşırımı ıslatırım
☐Hiçbir zaman ☐ Haftada 1 gün ☐Haftada 2–3 gün ☐Haftada 4–5 gün ☐ Her gün

2. İç çamaşırımı ıslattığımda
☐İç çamaşırımı ıslatmam ☐Hafif nemlidir ☐ Nemlidir ☐ Islaktır ☐ Sırılsıklamdır

3. Normalde işemek için günde ……tuvalete giderim
☐ 1–2 kez ☐ 3–4 kez ☐ 5–6 kez ☐ 7–8 kez ☐ Sekizden fazla

4. İşemek için acele tuvalete gitme zorunluluğu hissederim
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

5. Çişimi bacaklarımı çaprazlayarak ya da oturarak tutarım
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

6. Çişimi yaparken acır
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

7. Gece yatağımı ıslatırım
☐ Hiçbir zaman ☐ Ayda 3–4 gece ☐ Haftada 1–2 gece ☐ Haftada 4–5 gece ☐ Her gece

8. Gece çişimi yapmak için uyanırım
☐ Hiçbir zaman ☐ Ayda 3–4 gece ☐ Haftada 1–2 gece ☐ Haftada 4–5 gece ☐ Her gece

9. Çişimi yaparken, çişim kesilip, tekrar başlar
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

10. Çişimi yapmaya başlamak için ıkınırım ya da beklerim
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

11. Barsak hareketlerim (kaka)
☐ Günde birden fazla ☐ Her gün ☐ İki günde bir ☐ Üç günde bir ☐ Üç günde birden seyrek

12. Dışkım (kaka) serttir
☐ Hiçbir zaman ☐ Zamanın yarısından az ☐ Zamanın yarısında ☐ Zamanın yarısından fazla ☐ Her gün

13. İç çamaşırıma dışkı (kaka) kaçırırım
☐ Hiçbir zaman ☐ Haftada 1–2 kez ☐ Haftada 3 kez ☐ Haftada 4–5 kez ☐ Her gün

14. Bu soruları cevaplamak ne kadar kolaydı?
☐ Çok kolay ☐ Kolay ☐ Ne kolay, ne de zor ☐ Zor ☐ Çok güç