The Turkish version of the childhood bladder and bowel dysfunction questionnaire (CBBDQ): Cross–cultural adaptation, reliability and construct validity

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ABSTRACT

Background/Aims: Bladder and bowel dysfunctions are both prevalent health problems in pediatric population. The Childhood Bladder and Bowel Dysfunction Questionnaire (CBBDQ) is a parent-reported tool to evaluate and quantitatively assess bladder and bowel dysfunction symptoms in pediatric patients. This study aimed to translate the CBBDQ into Turkish language and culturally adapt it for use among 5-12-year-old children. Moreover, this study was also aimed to determine the reliability and the construct validity of the Turkish version. The main hypothesis of our study was that the CBBDQ would be translated into Turkish and culturally adapted so that Turkish parents could understand it. Additionally, we estimated that the Turkish version would have eventual internal consistency and test-retest reliability and admissible construct validity.

Materials and Methods: The CBBDQ was translated into Turkish language as per the guidelines and given two times to the parents of children with one-week interval to assess the test-retest reliability. The internal consistency was determined using the Cronbach's α value and the test-retest reliability was calculated using the inter-rater correlation coefficient. In the estimation of the construct validity, the dysfunctional voiding and incontinence scoring system (DVISS) and the pediatric quality of life inventory (PedsQL) in 5-12-year-old children were used as the external criteria.

Results: The participants were parents of 5-12-year-old children. The internal consistency was 0.83, that was the Cronbach's α value, which reflects a good result. The Turkish-CBBDQ5-12y and the DVISS showed a satisfactory correlation ($r=0.64$ $p<0.001$). There was no correlation between the Turkish-CBBDQ5-12y and the PedsQL-General Health and PedsQL-Psychological Health ($r=-0.17$, $p=0.1$ and $r=0.12$, $p=0.25$, respectively).

Conclusion: The Turkish-CBBDQ5-12y is a reliable and valid instrument in terms of content and construction and can be safely used in clinical practice.

Keywords: Childhood, bladder, bowel dysfunction, questionnaire, reliability

INTRODUCTION

Both bladder and bowel dysfunctions (BBDs) are prevalent clinical problems in pediatric population (1-3). For the assessment of bowel dysfunctions, the worldwide consensus Rome IV criteria is recommended. Bowel dysfunctions cover both fecal incontinence (FI) and constipation (4). In children, the range of prevalence of constipation is 0.7–29.6% (median 12%) and the range of prevalence of nonretentive FI is 0.0-1.8% (5, 6).

All the descriptions covering daytime urinary incontinence, urgency, urinary retention, hesitancy, and enuresis are interpreted as the bladder dysfunction by the International Children Continence Society (ICCS) (7). The prevalence of pediatric voiding dysfunction and urinary incontinence is nearly 10% in the community with different degrees of severity. In addition, enuresis is a frequent condition in children that is often discounted and underestimated by both children and their parents or caregivers (8, 9). BBDs may lead to the development of several problems, including unfavorable outcome on vesicourethral reflux, incontinence, urinary tract infection (UTI), and damage to upper or lower urinary tract in children (2, 3).

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In addition, the use of the Rome IV criteria is recommended by the ICCS for diagnosing bowel dysfunctions in children (10).

Diagnostic procedures include demographic history, physical examination, micturition and bowel diary, and complementary investigations (2). Using a childhood bladder and bowel dysfunction questionnaire (CBBDQ) might facilitate the appearance of relevant symptoms: the (diagnostic) questionnaire on pediatric gastrointestinal symptoms, the Bristol stool form scale, the bladder and bowel dysfunction questionnaire (BBDQ), the dysfunctional voiding and incontinence scoring system (DVISS), and pediatric symptom checklist (11-15). In Turkey, the BBDQ (three items for bowel problems) and the DVISS (one item for bowel problems) consisting of items on bladder dysfunctions, but lacking items on bowel problems, is usually applied (13, 14).

A combination of both childhood bladder and bowel dysfunctions (CBBDs) is more prevalent in clinical practice than generally assumed (16). When not specifically prompted at intake for both bladder and bowel dysfunctions, parents or children would only report the one dysfunction that bothers them most, leading to underreporting. Therefore, it is required to raise the awareness of caregivers about this subject to prevent the risk of underdiagnosing, with, as a consequence, delivering suboptimal therapy and invoking risk of relapses.

Recently, a new parent-reported evaluative questionnaire has been developed, particularly for 5–12-year-old children, according to the ICCS recommendations, to evaluate both dysfunctional bladder and bowel symptoms: the CBBDQ (17).

The CBBDQ is a parent-reported tool used to evaluate and quantitatively assess bowel and bladder dysfunction symptoms in children. It provides an objective and easy way to evaluate BBD symptoms without using invasive diagnostic tools and consists of (on the basis of the Rome III/IV criteria and ICCS recommendations) 18 items assessing how parents rate the symptoms affecting their child's daily life (17). The CBBDQ is published in English and is psychometrically tested, according to the Consensus-based standards for the selection of health measurement instruments (COSMIN), and structurally valid, while the internal consistencies of both bladder and bowel subscales was good (18). Therefore, we decided to translate the CBBDQ into Turkish for practical use in clinical evaluation to investigate the psychometric properties.

The basis of our hypothesis was that Turkish parents would be able to understand and use the CBBDQ with its Turkish-translated and culturally adapted version. Additionally, we hypothesized that the Turkish version would meet the acceptable level of internal consistency and test-retest reliability and, further, the construct validity with the DVISS and PedsQL in 5-7 and 8-12-year-old children, respectively.

MAIN POINTS

- *There is the potential for BMSCs to differentiate into enterocyte-like cells by transwell in vitro.*
- *ERK1/2 cell- signalling pathway is involved in the differentiation of BMSCs into enterocytes.*
- *Stem cell and tissue engineering show great hope for gut disease based on liver failure, further researches are needed.*

MATERIALS AND METHODS

The study was designed as a questionnaire-driven cross-sectional survey, which was answered by parents of children (5-12 years old) with urinary incontinence, enuresis, and constipation/FI in two phases.

Phase 1: Translation Process and Cultural Adaptation

The CBBDQ was translated into Turkish and the cultural adaptation was fulfilled according to the recommendations of Beaton (19).

Phase 2: Field Testing

Prior to inclusion, an informed consent form, which had been approved by the ethical committee at Istanbul University (IRB study protocol: 2017/487) was completed by parents.

Inclusion criteria were as follows: 1) parents of children aged between 5 and 12 years; 2) children who suffered from either daytime urinary incontinence, enuresis, constipation/FI, or combinations thereof; and 3) parents and children who read and approved the informed consent form. Exclusion criteria were as follows: 1) the presence of UTI; 2) patients having spinal cord injury or neurological disease; 3) and not being able to communicate.

The parents of the 5–12-year-old children were requested to complete the Turkish version of the CBBDQ as well as the already validated Turkish version of the DVISS and the parent proxy-report of the PedsQL (14, 20). The Turkish version of the CBBDQ, the DVISS, and the PedsQL (for

5-12-year-old children) were distributed to the parents by the physiotherapist in the waiting room after an interview with the psychiatrist. Subsequently, the same physiotherapist announced to the parents to complete the Turkish-$CBBDQ_{5\text{-}12y}$ by telephone, one week after their first assessment, for test-retest reliability. After parents filled the questionnaire, the physiotherapist overviewed for missing responses. The parents were inquired for missing questions on the questionnaire, and they were asked to give the reason for this. Any difficulty in comprehension of the questions and the answering options was noted.

Reported Outcome Measures

The CBBDQ covers two subscales: 1) the bladder symptoms scale (ten items) and 2) the bowel symptoms scale, consisting of abdominal pain and bloated belly (eight items). The parents were asked to state the presence of the symptoms in the past months, using a five-point Likert scale by checking a box numbered 0-4. "0" means "no symptoms," "4" means "symptoms appear almost every day or every day" (16).

The DVISS is a questionnaire originally designed with 14 items in Turkish to diagnose patients with dysfunctional voiding. The DVISS includes 12 questions on bladder dysfunction, one on bowel dysfunctions, and one on quality of life and has varying (Likert scales, dichotomous) answering options. The total score ranged from 0 to 35 points; the sum of scores higher than nine points indicates increased disease severity (14).

The health-related quality of life in healthy children and adolescents and those with acute and chronic health conditions might be evaluated with a scale named as the PedsQL. This scale was appropriate for evaluating the health-related quality of life of 5-12-year-old children. In the 5–7-year age group, the questionnaire is filled in by the researcher with the help of a diagram that symbolizes facial expressions of the child, such as happy, neutral, or sad. Unlike other age groups, the response scale of the child's form has three options. There is a parent and child form for the 8–12-year age group. Scores of the 23 items are evaluated in three areas. First, the total score of the scale is calculated by multiplying all the items with the items answered on all the scales. Second is the physical health total score, and third is the total score of psychosocial health, which is calculated by evaluating the sum of scores of the following items: emotional, social, and school functioning (17). The items are scored between 0 and 100 points. If the answer to the question is "never," it is marked as 0 = 100 points, "rarely" is marked as 1 = 75, "sometimes" is marked as 2 = 50, "frequently" is marked as 3 = 25, and "almost always" is marked as 4 = 0. The points are divided into the total number of answered questions. If more than 50% of the questions are left unanswered, the score cannot be evaluated. The higher the PedsQL total score, the better the reflection of the perceived health-related quality of life (21).

Statistical Analysis

The statistical analyses were completed using the Statistical Package for the Social Sciences 17.5 (SPSS Inc., Chicago, IL, USA). A p below 0.05 was considered as statistically significant. A power analysis was applied to determine the sample size at the beginning of the study. To achieve an intraclass correlation coefficient (ICC) of at least 0.8, a sample size of 50 participants was needed (22). In the descriptive analyses, data are pointed out as means and standard deviations (SDs) for continuous variables or as frequencies and percentages for categorical variables and the dispersion/distribution (SDs, ranges) for continuous variables. The Kolmogorov-Smirnov test was used to evaluate the normality of the distribution of data. Internal consistency, test-retest reliability, construct validity, and ceiling and floor effects were analyzed in this study.

Reliability

Reliability that includes internal consistency as well as the test-retest reliability refers to getting concurrent results after several measurements (23). A measure of the homogeneity of the questions that was included within a questionnaire (internal consistency) was calculated using the coefficient of Cronbach's α.

The Cronbach's α value of 0.70-0.89, 0.60-0.69, and ≤0.59 was regarded as good, acceptable, and poor, respectively. Cronbach's α ≥ 0.9 points excellent internal consistency; however, it may indicate redundancy of items (22).

In this study, the internal consistency of the Turkish version of the CBBDQ was determined using baseline data.

The test-retest reliability reveals a scale's effectiveness in producing consistent results when it readministered after a few days (24). The measurement was performed two times with a seven-day interval. The results of an ICC, which were the criteria for the test-retest reliability measurement of the Turkish-$CBBDQ_{5\text{-}12y}$, were compared to test accordment. Furthermore, the standard error mea-

surement (SEM), which is an index of measurement precision, was calculated using the ICC. The SEM is calculated using the SD of the scores obtained from the square root of (1 – ICC). The minimal detectable change (MDC) is the minimal amount of alteration occurring within the measurement error. The MDC is obtained by multiplying the SEM with 1.96 times the square root of 2 at the 95% limit of confidence (MDC 95%) (25).

Construct Validity

Validity is described as the extent of accurately reflected results while attempting to measure the specific concept. In this study, we investigated the construct validity, which is constituted by the convergent validity and the divergent validity. The relationship between the Turkish version of the DVISS and the PedsQL was used to detect the construct validity of the Turkish version of the CBBDQ (for 5–12-year-old children). The convergent validity was evaluated using the Turkish version of the DVISS. On the other hand, the divergent validity was assessed using the Turkish version of the PedsQL (5–12-year-old children). The construct validity was determined by calculating Spearman correlation coefficients and their 95% confidence intervals. Correlation intervals are classified as follows: r>0.81–1.0 is excellent, r>0.61–0.80 is very good, r>0.41–0.60 is good, r>0.21–0.40 is fair, and r>0.00–0.20 is poor.

Distribution and Ceiling/Floor Effects

The proportion of the patients scoring the maximum (72) or minimum (0) scores relative to the total number of patients was calculated to determine ceiling and floor effects of the Turkish version of the CBBDQ in the first and second tests. Descriptive statistics (number of percentage) were calculated to determine distribution and ceiling/floor effects, which were considered to be consistent if more than 30% of the subjects experienced them.

RESULTS

Translation Process and Cultural Adaptation

The CBBDQ was translated into Turkish and the cultural adaptation according to the stages recommended by Beaton was done (16). For the literal and conceptual translation of the Turkish version, two Turkish individuals with an expanded knowledge of English were assigned. The informed translator was a physical therapist, and the uninformed translator was a tourism professional. Both translators whose native language was Turkish were competent in English. The translations were separately fulfilled. Both translations were checked and the conceptional errors or contradictions of the first Turkish translation were highlighted by a bilingual person. Then, two native English speakers with a good command over Turkish individually retranslated the last Turkish version into English. A committee that consisted of four translators as well as the original authors compared the re-translated English version of the CBBDQ with the first English version. This committee approved the Turkish version and entitled it Turkish-CBBDQ$_{5\text{-}12y}$ (Appendix 1). For the determination of the feasibility of the Turkish-CBBDQ$_{5\text{-}12y}$, a pilot test was performed with 20 patients possessing the eligibility criteria of the study after the approval. Parents needed approximately 5-10 min to complete the Turkish-CBBDQ$_{5\text{-}12y}$. To meet cross-cultural validation, parents of children (5-12 years old) completed the questionnaire, after which the physiotherapists consulted with them. The parents were asked about their difficulties in comprehension and answering the questions right after completing the form.

According to the comments of the translators, the questions were apparent, brief, and easy to translate because the words of the English language corresponded one by one with Turkish words; however, some changes are needed for the more accurate explanation of some questions during the pilot test. The challenges in understanding of the questions were noted during the pilot test; the questions were revised accordingly with recommendations of the developers of the original CBBDQ. The changes were required to clarify the meaning of items 9 and 10 as follows. Item 9: In order to strengthen the meaning of enuresis, we added "involuntarily." Item 10: In order to strengthen the meaning of nocturia, we added "voluntarily." The Turkish version met the criteria for cross-cultural validation.

Field Testing

Participants

Children were initially examined by the child and adolescent psychiatrist from Bakirkoy Training and Research Hospital for Mental Health and Neurological Disorders and consequently referred to the physiotherapist, from June 2017 to June 2018. One hundred and forty children met the eligibility criteria for inclusion in the study. Of these, 17 parents of children were not allowed to participate in the study, and 38 parents of children could not be reached over the phone during the retest. The data of the remaining 85 parents of children were used to calculate the reliability and construct validity. The demographic variables of the children are reflected in Table 1. The

mean age of the children was 9.6±2.0 years (within the range of 5-12 years). 67.1% of children were male.

Reliability

In Table 2, the means and SDs for each of the scores that are obtained from the first and second tests of the Turkish-CBBDQ$_{5\text{-}12y}$ are shown.

Table 1. Demographics of study groups.

Variable	N (%)
Children	85
Gender	
Male	57 (67.1)
Female	28 (32.9)
Age (years)	
Mean±SD	9.59±2
Range	5-12
Weight (kg)	
Mean±SD	35.57±10.95
Range	13-82
Height (cm)	
Mean±SD	135.82±13.67
Range	90-165
BMI (kg/m^2)	
Mean±SD	18.95±3.58
Range	12.4-30.12
Potty trained age	
1 (%)	10 (11.8)
2 (%)	38 (44.7)
3 (%)	27 (31.8)
4 (%)	6 (7.1)
5 (%)	4 (4.7)

SD: standard deviation; BMI: body mass index.

A Cronbach's α value of 0.83 (0.71 for the ten-item bladder subscale and 0.85 for the eight-item bowel subscale) was an indicator of good internal consistency of the Turkish-CBBDQ$_{5\text{-}12y}$. Table 2 shows the mean values of the first and second tests of the Turkish-CBBDQ$_{5\text{-}12y}$ and the first test of the Turkish version of the DVISS and PedsQL subscales. Moreover, the ICC score was 0.97, which was a sign of excellent test-retest reliability of the Turkish-CBBDQ$_{5\text{-}12y}$ shown in Table 3. The Turkish-CBBDQ$_{5\text{-}12y}$ had the values of 2.2 and 6.1 for the SEM and the MDC, respectively.

Construct Validity

The statistical results, including r=0.64 and P<0.001, manifested a good correlation between the Turkish-CBBDQ$_{5\text{-}12y}$ and the DVISS. The correlations between the Turkish-CBBDQ$_{5\text{-}12y}$ and the PedsQL physical health was found to be fair (r=–0.28 and p=0.01). No correlation was found between the Turkish-CBBDQ$_{5\text{-}12y}$ and the PedsQL-General Health and PedsQL-Psychological Health (r=–0.17, p=0.1 and r=–0.12, p=0.25, respectively) according to the results demonstrated in Table 4.

Distribution and Ceiling/Floor Effects

Nobody achieved the minimum or maximum score, implying no floor or ceiling effects in the Turkish-CBBDQ$_{5\text{-}12y}$.

DISCUSSION

This study aimed to translate the CBBDQ into Turkish and culturally adapt it, which resulted in the Turkish-CBBDQ$_{5\text{-}12y.}$ Another purpose of this study was to determine the construct validity and the reliability (test-retest reliability and internal consistency) of the Turkish-CBBDQ$_{5\text{-}12y.}$ We chose the CBBDQ because of the close participation of the target group, the parents, during the development process, the stringent psychometric criteria used, and the equal weight attached to the bladder and bowel items.

Table 2. Descriptive statistics for the outcomes reported by patient's parents.

Assessment outcomes	Mean±SD	Median (range)	SE	95% CI
Turkish p-CBBDQ$_{5\text{-}12y}$ 1	26.88±12.89	25 (7-61)	1.39	[24.08-29.51]
Turkish p-CBBDQ$_{5\text{-}12y}$ 2	26.82±11.59	25 (10-52)	1.25	[24.28-29.14]
DVISS	14.20±4.67	13 (5-24)	0.5	[13.19-15.11]
PedsQL-General Health	75.59±14.11	81.5 (32.6-96.7)	1.53	[72.6-78.4]
PedsQL-Physical Health	84.98±14.35	87.5 (50-100)	1.55	[82.09-88.03]
PedsQL-Psychological Health	71.56±17.14	76.6 (21.6-96.6)	1.85	[67.84-75.2]

CBBDQ: Childhood Bladder and Bowel Dysfunction Questionnaire; 1: first test; 2: second test (retest); DVISS: dysfunctional voiding and incontinence scoring system; PedsQL: Pediatric Quality of Life Inventory; SD: standard deviation; SE: standard error; CI: confidence interval.
Data are presented as mean±SD.

Table 3. Test-retest reliability of the Turkish-CBBDQ$_{5\text{-}12y}$.

Variable	T1	T2	ICC	Cronbach's α
Turkish p-CBBDQ5-12y	26.88±12.89	26.82±11.59	0.97	0.83

T1: first test; T2: second test (retest); ICC: intraclass correlation coefficient.

Table 4. Table 4. Construct validity of the Turkish-CBBDQ$_{5\text{-}12y}$.

Variables	DVISS	DVISS-QL	PedsQL-General Health	PedsQL-Physical Health	PedsQL-Psychological Health
Turkish p-CBBDQ$_{5\text{-}12y}$	rho 0.640	0.575	-0.176	-0.278	-0.125
p1	0.00*	0.00*	0.10	0.01*	0.25

DVISS: Dysfunctional Voiding and Incontinence Scoring System; DVISS-QL: Dysfunctional Voiding and Incontinence Scoring System-Quality of Life; PedsQL: Pediatric Quality of Life.
1Spearman correlation test.
*Significant at the p<0.05 level.

The primary finding of this study was that the Turkish-CBBDQ$_{5\text{-}12y}$ was cross-culturally validated and had good measurement properties, good reliability, and suitable construct validity. It can be used by Turkish parents of 5–12-year-old children to evaluate CBBD symptoms.

The original version of the CBBDQ was successfully translated and adapted into Turkish. Good internal consistency and high test-retest reliability were demonstrated. The original CBBDQ reported data of the ten-item bladder subscale (Cronbach's α was 0.74) and the eight-item bowel subscale (Cronbach's α was 0.71) (16). Differences could be explained by the differences of the (Dutch and Turkish) patients. The original version of the CBBDQ was tested in a heterogeneous group of children (primary, secondary, and tertiary healthcare). The Turkish version of the CBBDQ was tested only in tertiary healthcare children with predominantly urinary problems.

The DVISS is most closely related to the CBBDQ with regard to the measured construct validity. For the total scale, a Cronbach's α value of 0.72 was shown. The DVISS differs from the CBBDQ because it is a child-reported questionnaire, focuses mainly on dysfunctional voiding, and primarily has a diagnostic purpose (14). Akbal et al. offered that this questionnaire is practical for diagnosis and follow-up in the treatment of bladder dysfunction. In addition to this, the DVISS has some limitations. The disadvantage of this questionnaire is the lack of, in particular, sufficient and adequate questions on bowel dysfunctions, which may have possible effects on the commentary of childhood BBD as a whole (14).

Farhat et al. verify the symptom score (dysfunctional voiding scoring system [DVSS]) for wetting and functional disorders in children with ten questions (26). The DVSS has been used and translated into other languages (27, 28). However, the disadvantages of this questionnaire are the lack of international consensus-based items on bowel dysfunctions and psychometric imperfections (14, 29).

The time interval between retest measurements is an important factor when determining the test-retest reliability (27). The Turkish-CBBDQ$_{5\text{-}12y}$ includes a fewer number of questions, which pose the risk of patients becoming acquainted with the questions or memorizing and recalling them. Therefore, seven days was chosen for the retest evaluation to decrease the probability of remembering the questions. Therewithal, we think that the patients' conditions would not be anticipated to change over this period because there were no interventions in this period. The MDC was found to be 6.1; when a patient is evaluated two times with the Turkish-CBBDQ$_{5\text{-}12y}$, a change of less than 6.1 should be noted as a reflection of the measurement error rather than a right alteration in the patient's situation.

Future studies are required to evaluate responsiveness and to detect the minimum clinically important differences for the Turkish-CBBDQ$_{5\text{-}12y}$.

Based on the results derived in the assessments of the measurement properties, the Turkish-CBBDQ$_{5\text{-}12y}$ was cross-culturally validated, reliable (in terms of internal consistency and test-retest reliability), and construct valid and can be used in clinical practice.

Ethics Committee Approval: Ethical approval for this study was obtained from the Human Research Ethics Committee of Istanbul University (IRB study protocol: 2017/487).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

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