Validity and Reliability of a Thai Behavioral and Emotional Screening Tool for Children with Enuresis (TBEST-E)

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ABSTRACT

Objective: Psychological comorbidity in children with enuresis is common and its screening is recommended. A brief validated screening instrument is needed for a busy medical practice. This study focused on the development of the Thai Behavioral and Emotional Screening Tool for children with Enuresis (TBEST-E) and aimed to examine its psychometric properties.

Materials and Methods: Using the Short Screening Instrument for Psychological Problems in Enuresis (SSIPPE) as a template, the 15-item with a yes/no answer format of the TBEST-E was developed for the screening of emotional problems (7 items), attention and hyperactivity/impulsivity problems (3 items each), and oppositional defiant symptoms (2 items). The parents of the children with enuresis completed the TBEST-E and the behavioral rating scale "Thai Youth Checklist" (TYC). The optimal cut-off for further assessment, the sensitivity, and the specificity the TBEST-E were identified using receiver operating characteristic (ROC) curves.

Results: After an adaptation following comments from three child psychiatrists, the TBEST-E showed a content validity of 0.9, an internal consistency of 0.71. A total of 33 children with enuresis (median age = 9, interquartile range = 6.5-11 years) were recruited. Further assessment was indicated when one of the following occurred; at least 3 emotional problems; 3 attention problems; or 2 hyperactivity/impulsivity together with 2 oppositional defiant symptoms. The overall sensitivity and specificity were 0.88 and 0.71 respectively with the accuracy of 0.84 (95% CI = 0.68-0.95).

Conclusion: The TBEST-E is time-efficient and has acceptable psychometric properties in early detection of common psychological problems in children with enuresis.

Keywords: Enuresis; emotion; behavior; psychological; questionnaire; SSIPPE (Siriraj Med J 2023; 75: 674-679)

INTRODUCTION

Enuresis is the intermittent involuntary leakage of urine during sleep and is a heterogenous disorder consisting of different subgroups. With and without the presence of lower urinary tract symptoms (LUTs), enuresis is classified as non-monosymptomatic and monosymptomatic, respectively. It is also categorized as primary when the longest period of dryness is less than 6 months, and secondary if there is relapse after more than 6 months of dryness. The majority of enuresis cases are primary, with genetic predisposition, biological factors, and developmental variations, contributing to its multifactorial etiology.[1,2] The essence of its pathogenesis is a mismatch between nocturnal urine production and nocturnal functional bladder capacity in combination with deficient arousal and/or sleep disorders. In some

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children, sleep-disordered breathing may perpetuate the problem due to an increase in arousal thresholds while sleeping.[2] Primary enuresis is also considered a maturational disorder of the central nervous system, considering that its prevalence decreases with increasing age: 5–10% in 7-year-olds, 3% in adolescents, and 0.5–1% in adults. A study in Thailand found a similar trend of decreasing prevalence with increasing age: 10% in 5-year-olds, 5.3% in 7-year-olds, 3% in 10-year-olds, and 1.2% in 12-year-olds.[3]

Psychological and psychiatric comorbidities in children with enuresis are common and well documented; 20%-30% of children with enuresis have clinically relevant comorbid disorders.[4,5] ADHD is the most common comorbid disorder in enuresis; individuals with ADHD have a 2-3 times greater risk of enuresis than those without it.[6] Other neurodevelopmental conditions, i.e., autism spectrum disorder and intellectual disability, neurological "soft signs", and motor deficits are also associated with incontinence.[7] Moreover, more recent previous studies reported association of enuresis with a range of externalizing and internalizing problems, including ADHD, oppositional defiant disorder, conduct disorder, anxiety and depression.[8] Enuresis also affects children's socialization, self-esteem, interpersonal relationships, and emotional health. These behavioral and emotional problems lead to poor quality of life not only for the children, but also their families. More importantly, if these behavioral and emotional problems are not screened and treated properly, the effective treatment of enuresis may not be possible.[9]

Emotional and behavioral screening is recommended as part of a comprehensive assessment of enuresis. Although available broadband behavioral questionnaires in Thai language exist, they are usually long and can be time-consuming in terms of completing, scoring and interpretation. A brief validated screening instrument in Thai language is needed. Therefore, we aimed to develop and validate a brief screening tool in Thai language for use in busy medical settings.

MATERIALS AND METHODS

The study was approved by Siriraj Institutional Review Board (SIRB), Faculty of Medicine Siriraj Hospital (COA no. Si 926/2020). This is a cross-sectional study. The study population included children aged 6-18 years who reportedly had enuresis at least once a month. The participants with enuresis were recruited from specialized pediatric clinics i.e., the nephrology clinic, child psychiatric-consultation-liaison service, developmental behavioral and continuity of care clinics, at the Faculty of Medicine Siriraj Hospital from December 2020 to September 2021. Candidates with a diagnosis of intellectual disability or a neurological disorder resulting in mental age less than 6 years old were excluded. A set of 33 enuretic children with positive screening of psychosocial problems is needed for the TBEST-E to achieve a sensitivity of at least 0.75 with both type I and Type II error of 0.05, and 0.15, respectively.[10] A sample size of 55 was calculated assuming a rate of psychological comorbidity at 60% among enuretic children presenting to a specialize pediatric service.[4]

Guided by the Short Screening Instrument for Psychological Problems in Enuresis (SSIPPE), the 15-item Thai Behavioral and Emotional Screening Tool for children with Enuresis (TBEST-E) was developed. SSIPPE is a validated parent-report questionnaire, mentioned by the International Society for Continence in Children (ICCS).[2] Its construct is based on the items with the highest scores on the Dutch version of the Child Behavior Checklist (CBCL). The construct features three scales in the form of 13 questions in a yes/no answer format: emotional problems, attention problems, and hyperactivity symptoms.[11] The SSIPE has acceptable psychometric properties for early screening of psychosocial problems in children with enuresis and has been used in many studies.[8,12-14] The TBEST-E is also a parent-report questionnaire for the screening of common psychological comorbidities i.e., anxiety, depression, ADHD, and oppositional defiant disorder, in children aged 6-18 years with enuresis. There were 4 scales in the form of 15 questions in a yes/no answer format: 7 items of internalizing problems (anxiety and depression), 3 items of attention problems, 3 items of hyperactivity/impulsivity symptoms, and 2 items of oppositional defiant symptoms (APPENDIX 1). All 15 TBEST-E items were examined for relevance, clarity, and simplicity by three child and adolescent psychiatrists experienced in the evaluation of enuresis. The content validity and the internal consistency were calculated using the Index of Item-Objective Congruence (IOC) test and the kappa coefficient test, respectively. The final version of the TBEST-E was subsequently validated against the standard behavioral screening rating scale: Thai Youth Checklist (TYC)

The TYC is the Thai version of the Child Behavioral Checklist (CBCL). The CBCL was originally developed by Achenbach and Ruffle (2000) to identify problem behaviors over the preceding 6 months. We used the parent version, school-age form for children aged 6-18 years of the TYC, which has been validated in Thai children and adolescents with adequate psychometric properties.[15] The TYC is a broadband behavioral rating

scale which comprises 135 problem items subdivided into several subscales; anxiety, somatic complaints, depression, immaturity, hyperactivity/impulsivity and social problems, aggressive behavior, delinquency, attention problems, and thought problems. To complete TYC, parents were asked to evaluate their and child's behavior during the preceding 6 months on a 3-point likert scale for each item (0 = "Absent", 1 = "Occurs sometimes", 2 = "Occurs often"). Raw scores for each scale are converted to norm-referenced T-scores, with separate norms provided for each gender within the 6–11 and 12–18-year age ranges. According to the Thai normative data, a T-score < 67.5 indicates non-clinical symptoms, a T-score between 67.5 and 70 indicates that the child is at risk for clinical symptoms (borderline clinical range), and a T-score > 70 indicates clinical symptoms (clinical range). These qualitative categories reflect symptom severity, and scores falling within clinical range suggests the need for a more comprehensive diagnostic assessment.[15,16] Moreover, scores on internalizing, externalizing, and total problems can be analyzed. The internalizing domain is a broad measure of emotional problems including anxiety and depressive symptoms that incorporates 3 subscales: anxiety, somatic complaints, and depression. The externalizing domain includes 4 subscales: immaturity, hyperactivity/impulsivity and social problems, aggressive behavior, and delinquency. The total problems score sums all TYC items including those on the remaining subscales: attention problems and thought problems.

In this study scores on total, internalizing and externalizing problems falling within clinical range and were used to an estimate of behavioral and emotional problems and indicate a positive TYC result. After obtaining informed consent, the demographic and enuresis history questionnaire, TYC and TBEST-E were given to 40 parents of eligible participants; of these, 33 completed adequate questionnaire items.

Statistical analysis

Descriptive statistics were used to illustrate the children's demographics and characteristics concerning the frequency of and symptoms related to enuresis. The TBEST-E responses were rated on a 0-and-1 binary scale for each item ("no" = 0, "yes" = 1). Each TYC response was classified as positive when at least one of the 3 T-scores; internalizing, externalizing or total problem scores were in clinical range. The TBEST-E was validated using receiver operating characteristic (ROC) curves to indicate the optimum cut-off to achieve acceptable sensitivity and specificity.

RESULTS

There were 33 children whose parents completed adequate items of TBEST-E and TYC: of these, 22 (66.7%) were boys, 20 (60.6%) were younger than 10, with a median age of 9 years old, and 19 (57.6%) had non-monosymptomatic enuresis (NMNE). Other associated medical conditions were constipation and snoring, found in 12 (36.4%) and 16 (48.5%) participants, respectively. Demographic data, characteristics of enuresis and associated medical conditions are reported in Table 1.

With T-scores in clinical range, the TYC identified 26 (78.8%) children who had significant clinical symptoms in at least one domain of emotional or behavioral problems (internalizing, externalizing, or total problems): of these, 16 (48.5%) had significant internalizing problems, 22 (66.7%) had significant externalizing problems, and 15 (45.5%) had the overall extent of total problems including attention problems. This suggested that 26 children were in need of a more comprehensive diagnostic assessment, particularly for common psychiatric comorbidities in children with enuresis such as ADHD, anxiety, and depression.

Regarding the psychometric properties, TBEST-E demonstrated the content validity of 0.9 and strong internal consistency with a Cronbach's alpha coefficient of 0.71. Using the ROC curves, the optimal cut-offs for the TBEST-E were three or more internalizing problems, three attention problems, or two or more hyperactivity/impulsivity problems together with two oppositional defiant problems. Fig 1 shows the ROC curves for TYC internalizing, externalizing, or total problem scales as predicted by TBEST-E emotional problem items (A), TBEST-E attention problem items (B), TBEST-E hyperactivity/impulsivity items (C), and TBEST-E oppositional defiant symptoms items (D). Using the above criteria, the TBEST-E predicted a positive result of TYC with sensitivity and specificity of 88.46% and 71.43%, respectively (Table 2).

DISCUSSION

Enuresis is a common problem with significant psychosocial comorbidities. Early screening for emotional and behavioral problems can facilitate effective treatment and optimize outcomes.

Based on the demographics of this study, all participants were younger than 12 and the majority were younger than 9. More than half of the participants had non-monosymptomatic enuresis and almost half were frequent bed-wetter with the frequency of more than 4 times/week.

TABLE 1. Demographic data and detail regarding the enuresis history of the participants (N=33)

Demographic characteristics	Number (%)
Gender: male	22 (66.7)
Age[a]	9 (6.5-11)
Education	
Kindergarten	4 (12.1)
Grade 1-3	15 (45.5)
Grade 4-6	11 (33.3)
Grade 7-9	3 (9.1)
Frequency of enuresis	
1 time/month	11 (33.3)
More than 2 times/week	5 (15.2)
More than 4 times/week	16 (48.5)
Have a symptom related with enuresis	
Frequent urination more than 8 times/day	9 (27.3)
Frequent urination less than 3 times/day	4 (12.1)
Urge incontinence	5 (15.2)
Daytime enuresis	7 (21.2)
Staining	-
Voiding intermittency	2 (6.1)
Dysuria	2 (6.1)
Postmicturition dribble	3 (9.1)
Hesitancy	7 (21.2)
Associated symptom	
Constipation	12 (36.4)
Snoring	16 (48.5)

[a]Data presented as median (IQR)

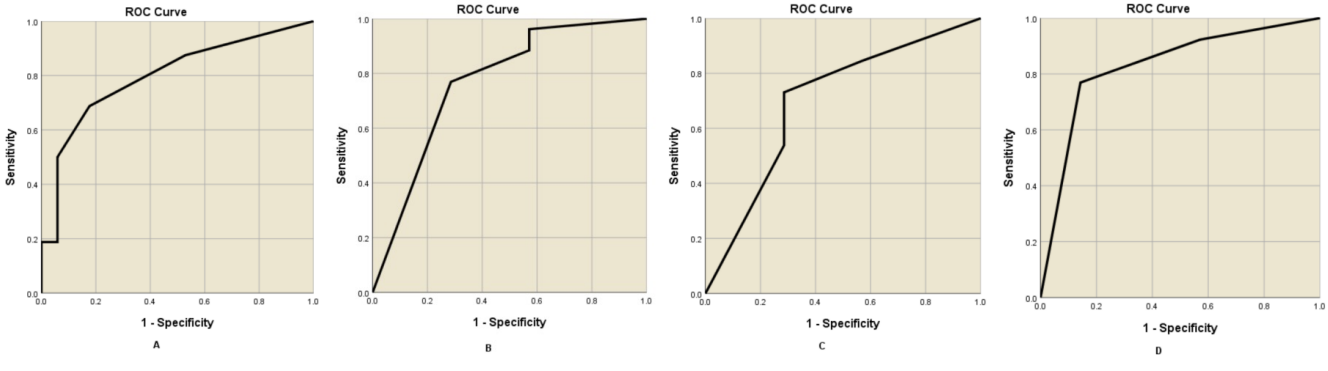

Fig 1. ROC curves for TYC internalizing, externalizing, or total problem scales as predicted by TBEST-E emotional items (A), TBEST-E inattention items (B), TBEST-E hyperactivity/impulsivity items (C), and TBEST-E oppositional defiant items (D).

TABLE 2. Screening test: sensitivity, specificity, positive predictive value, negative predictive value, and accuracy, according to criteria A and criteria B

Criteria	TP[1]	FP[2]	FN[3]	TN[4]	Sensitivity	Specificity	PPV	NPV	Accuracy
Criteria A Positive for one of the emotional problems or inattention problems or hyperactive problems	24	3	2	4	92.31% (74.87% to 99.05%)	57.14% (18.41% to 90.10%)	88.88% (77.14% to 94.99%)	66.68% (31.34% to 89.77%)	84.85%
Criteria B Positive for one of the emotional problems or inattention problems, or positive for both a hyperactivity problem and an opposition problem	23	2	3	5	88.46% (69.85% to 97.55%)	71.43% (29.04% to 96.33%)	92.00% (77.94% to 97.40%)	62.51% (34.26% to 84.21%)	84.85%

[1]TP: True positive, [2]FP: False positive, [3]FN: False negative, [4]TN: True negative

Constipation and snoring were associated with enuresis in significant numbers of children. Other studies also demonstrated higher prevalence in younger children and decreasing rates with increasing age.[4] Association between LUTs i.e., detrusor overactivity in NMNE and constipation is also common.[11,13]

There was an extremely high rate of the clinical range of the TYC in the study population (78.8%) compared to those of other studies of children with enuresis (20-40%). However, the rate was similar to that of studies in tertiary care sample with ADHD being the most common psychiatric disorder among enuretic children.[4,17] This study also revealed higher rate of significant externalizing problems which included symptoms of ADHD. Although several participants from our child psychiatric clinic might have a diagnosis of ADHD and its treatment[18], we did not collect any of the psychiatric diagnosis in our sample. The TYC T-scores in clinical range were an estimate of significant behavioral and emotional problems justified for a referral to further diagnostic assessment.

Compared to the SSIPPE, the TBEST-T has a lower specificity (71.43% vs. 91-99%) but higher sensitivity (88.46% vs. 29-75%).[11,13] Overall, the TBEST-E has acceptable psychometric properties in the early screening of psychological problems in children with enuresis. Moreover, a questionnaire with a yes/no answer format is easy for parents to complete and practical for primary care professionals to interpret.

Our study has some limitations. Firstly, the sample size was small. In addition, our population consists of children receiving medical services in Siriraj Hospital, who are often more susceptible to behavioral and emotional issues than the community population. Thus, the sensitivity and specificity obtained from the study can be different in other populations with low prevalence of emotional or behavioral comorbidities. A large sample size of participants should be surveyed for the TBEST-E psychometric properties to be representative of cases managed in community or primary care. Secondly, this study did not assess psychiatric diagnoses and its validity was evaluated against symptoms of significant psychological/psychiatric problems. So, the TBEST-E only offers initial screening and by no means replace a psychiatric/psychological assessment. The cut-off is to help practitioners decide which patients would need a referral to a more comprehensive diagnostic assessment of psychiatric comorbidities.

CONCLUSION

The TBEST-E has acceptable psychometric properties for the screening of common psychological problems in patients with enuresis. It is suitable for use as a first-line screening tool in a busy pediatric practice.

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