TRANSLATION AND CROSS-CULTURAL ADAPTATION OF THE SLEEP-RELATED BREATHING DISORDER SCALE OF THE PEDIATRIC SLEEP QUESTIONNAIRE INTO VIETNAMESE LANGUAGE

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Objective: The Pediatric Sleep Questionnaire (PSQ) has shown to be a valuable screening tool with good sensitivity and specificity for obstructive sleep apnea among children. Our aim was to cross-culturally translate and adapt the PSQ into Vietnamese language for clinical and research using. Methods: The Vietnamese version of the SRBD-PSQ was translated by the University of Michigan, which reserves the copyrights. The adapted questionnaire was applied to parents of 60 children aged 6 - 14 years. The reliability of the translated questionnaire was measured by Cronbach α, Pearson correlation and Kappa statistics. Results: Vietnamese PSQ has shown high internal consistency by Cronbach's α (0.781 for the total test, 0.745 for subscale "snoring", 0.682 for "sleepiness", 0.763 for "behaviour"). Test-retest reliability for all items presented a good correlation, with the Kappa statistic ranged between 0.498 and 0.832. Conclusion: The Vietnamese version of PSQ has sufficient reliability and validity to measure obstructive sleep apnea outcome and showed to be linguistically accurate and acceptable for use among Vietnamese children.

Keywords: Pediatric sleep questionnaire, Obstructive sleep apnea, Children.

I. INTRODUCTION

Pediatric obstructive sleep apnea syndrome (OSAS) is characterized by recurring episodes of complete and/or partial obstruction of the upper airway during sleep, resulting in intermittent hypoxemia and hypercapnia, frequent arousals, and sleep fragmentation.[1] The estimated prevalence in children is 1% to 3%; however, the prevalence is difficult to measure because of subdiagnosis.[2,3]

Polysomnography (PSG) is the gold standard for diagnosing and quantifying OSAS.[1,3] Nocturnal PSG recordings provide unbiased and objective information on various sleep-related characteristics such as sleep architecture, cardiac and respiratory patterns, and gas exchange. However, several factors have hampered a more extensive implementation of such diagnostic procedures, including the inconvenience for both parents and child spending the night in the laboratory, the rather onerous and labor-intensive nature of this diagnostic procedure, the relative scarcity of laboratories with expertise in children's sleep disorders, and as a corollary to this, the extended waiting period between referral and actual testing. Thus, the diagnosis of pediatric

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OSAS is still often made on a clinical basis.[4]

Paediatric Sleep Questionnaire (PSQ), and the Sleep Related Breathing Disorder (SRBD) scale was designed by Chervin et al. to predict sleep-related breathing disorders, including obstructive sleep apnea syndrome.[5] PSQ has its sensitivity and specificity evaluated at 78% and 72%, respectively, with a reliability at Class I and Class II, according to the classification of the American Academy of Neurology (AAN).[5,6] The European Respiratory Society Task Force defined PSQ as a "useful tool" to predict OSAS, detecting the neurobehavioral consequences associated with OSAS and evaluating their regression after treatment.[6] For these reasons, it is one of the most used and validated screening tools, appearing at least as effective as or better than polysomnography.[5-7] PSQ has been translated into different languages such as Spanish, Turkish, Malaysian, Chinese and Portuguese.[8-11]

In Vietnam, polysomnography has limited effectiveness for the diagnosis of pediatric OSA due to its high associated cost, inconvenient nature, and lack of availability in underserved regions. These limitations have prompted healthcare specialists to develop diagnostic tools that are affordable and readily available such as Vietnamese Pediatric Sleep Questionnaire. The purpose of the current study was to evaluate a translation of the PSQ in children in Vietnam by checking the accuracy of the translation, assesing its content validity, and determining whether it could be clearly understood when piloted in a sample of children.

II. METHODS

1. The original Pediatric Sleep Questionnaire

The original version of the PSQ or the SRBD scale is a questionnaire that can be autoadministered to parents of children aged 2 - 18 years. The PSQ scale contains 22 symptom items include a 7-item sleepiness scale, a 9-item snoring scale, and a 6-item inattention/ hyperactivity scale derived originally from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for attention-deficit/hyperactivity disorder (ADHD).[5] The responses are coded as "yes" = 1, "no" = 0, and "don't know" = missing. PSQ score is calculated as the ratio between the sum of yes and number of answered questions; a PSQ score ≥ 0.33 is indicative of considered positive and suggests the presence of pediatric sleep-related breathing disorders.

2. Translation and cross-cultural adaptation of the PSQ/SRBD

The translation of the SRBD-PSQ to Vietnamese was performed by a certified translator team from the University of Michigan. Professor Chervin and the University of Michigan, which reserves the copyrights, granted us permission to use and adapt a Vietnamese version of the SRBD-PSQ.

Cross-cultural validation of the PSQ: to assess the clarity, adequacy and cultural relevance of the Vietnamese version, the translated version was applied to the parents of a sample of 60 children aged 6 - 14 years from Allergy- Immunology- Rheumatology outpatient clinics, Vietnam National Children's hospital between June 2021 and June 2022. In these group of children, the questionnaire was completed again after an average period of 14 days to evaluate the test- retest.

3. Statistical analysis

Regarding the completed questionnaires, the following statistical tests were applied to assess their performance:

- Internal consistency, evaluating the homogeneity among different items of the questionnaire with the total questionnaire using

the Cronbach's alpha test. Values between 0.5 and 0.7 represent moderate reliability, and equal to or greater than 0.7 represent high reliability.[12]

- Content validation is measured using Pearson's correlation test for each item of the questionnaire and compared to the total score value. Values above 0.3 have a moderate correlation and value above 0.8 have a strong correlation.[13]

- Test - retest of patients who completed the questionnaire twice, using the Kappa concordance test; value is 0.4 - 0.6 shows moderate agreement; value is 0.6 - 0.8 shows high agreement, and value is above 0.8 shows perfect agreement.[14]

The data set was analysed using SPSS statistical analysis software version 20 (SPSS, Inc., USA).

4. Research ethics

The study was approved by the Vietnam National Children's Hospital Ethical Review Board (No 2610/ BVNTU-HDDD). Informed consent was required from all individual participants in the study.

III. RESULTS

1. Characteristics of study subjects

The sample consisted of 60 children, including 46 males (76.7%) and 14 females (23.3%), aged between 6 and 14 years (mean 9.28 ± 2.1 years old). Most respondents were the children's mother, at 86.7%. 21 caregivers graduated from university, 3 caregivers from post university, 29 graduated from high school, 07 graduated from elementary school. The demographic data are shown in Table 1. In all 60 applications of the test, the parents did not report any difficulty in answering any question in the questionnaire. The rate of "don't know" responses was 2.1% of average for the 22 questions.

Table 1. Demographic characteristics of study's participants

Characteristics	n (%)
Genders	
Males	46 (76.7)
Females	14 (23.3)
Age, years	
Mean ± SD	9.28 ± 2.1
Range	6 -14
Parents	
Mother	52 (86.7)
Father	08 (13.3)

2. Internal consistency

The internal consistency of the study was performed using the Cronbach's alpha coefficient. Analyzes were performed for each subdomain and for the entire questionnaire. The entire questionnaire (Vietnamese PSQ/ SRDB) was highly reliable, with Cronbach's alpha of 0.763. The snoring domain was 0.781,

the sleepiness domain was 0.745 and the behavioural domain was 0.682. The values are shown in Table 2.

Table 2. Internal consistency of the Vietnamese PSQ using Cronbach's α.

Variables	Number of items	Cronbach's alpha
Subdomain Snorring	9	0.781
Subdomain Spleepiness	7	0.745
Subdomain Behaviour	6	0.682
Total	22	0.763

3. Test - retest

Test - retest was assessed using the Kappa Agreement test, and was applied to 60 children, whose parents answered the same questionnaire on two different days, with an average interval of 14 days between them.

The values corresponding to each question are described in table 3. Questions A3 had almost perfect agreement. Questions A4, A6, A25, B7 and C5 had moderate agreement; all other questions had high agreement.

Table 3. Test- retest reliability of the Vietnamese PSQ.

Question	Kappa	95%CI	p-Value
A2	0.613	0.23 - 0.99	< 0.001
A3	0.832	0.79 - 1.00	< 0.001
A4	0.515	0.35 - 1.00	< 0.001
A5	0.615	0.20 - 1.00	< 0.001
A6	0.498	0.19 - 0.80	< 0.001
A7	0.655	0.38 - 0.93	< 0.001
A24	0.664	0.31 - 1.00	< 0.001
A25	0.544	0.03 - 0.85	< 0.001
A32	0.683	0.54 - 1.00	< 0.001
B1	0.693	0.41 - 0.97	< 0.001
B2	0.663	0.39 - 0.92	< 0.001
B4	0.635	0.30 - 0.95	< 0.001
B6	0.787	0.54 - 1.00	< 0.001
B7	0.566	0.26 - 0.87	< 0.001
B9	0.651	0.02 - 1.00	< 0.001
B22	0.721	0.67 - 1.00	< 0.001

Question	Kappa	95%CI	p-Value
C3	0.651	0.37 - 0.93	< 0.001
C5	0.591	0.28 - 0.90	< 0.001
C8	0.715	0.33 - 1.00	< 0.001
C10	0.622	0.29 - 0.96	< 0.001
C14	0.676	0.31 - 1.00	< 0.001
C18	0.655	0.65 - 1.00	< 0.001

4. Content validation

For content validation, Pearson's correlation test was used for each item of the questionnaire. All questions showed moderate (> 0.3 and < 0.8) and strong (≥ 0.8) agreement (Table 4).

Table 4. Pearson's correlation coefficient (r) for each question

Question	r-Pearson	95%CI	p-Value
A2	0.756	0.62 - 0.85	< 0.001
A3	0.563	0.44 - 0.76	< 0.001
A4	0.557	0.37 - 0.72	< 0.001
A5	0.669	0.66 - 0.87	< 0.001
A6	0.712	0.56 - 0.82	< 0.001
A7	0.658	0.38 - 0.73	< 0.001
A24	0.544	0.21 - 0.63	< 0.001
A25	0.421	0.18 - 0.61	< 0.001
A32	0.425	-0.01 - 0.47	< 0.001
B1	0.581	0.30 - 0.68	< 0.001
B2	0.554	0.33 - 0.70	< 0.001
B4	0.511	0.29 - 0.67	< 0.001
B6	0.434	0.10 - 0.55	< 0.001
B7	0.452	0.31 - 0.69	< 0.001
B9	0.312	-0.13 - 0.37	< 0.001
B22	0.353	0.08 - 0.55	< 0.001
C3	0.522	0.31 - 0.69	< 0.001
C5	0.665	0.48 - 0.78	< 0.001

Question	r-Pearson	95%CI	p-Value
C8	0.457	0.37 - 0.72	< 0.001
C10	0.498	0.25 - 0.65	< 0.001
C14	0.542	0.19 - 0.61	< 0.001
C18	0.639	0.15 - 0.59	< 0.001

IV. DISCUSSION

To manage OSAS early, several paediatric screen questionnaires have been proposed, for example: Sleep Clinical Record, OSA-18, Brouilette Score, “I’m sleep”, Sleeping Sleepless Sleepy Disturbed Rest and Paediatric Sleep Questionnaire (PSQ)...[2,3,5] Since its validation by Chervin et al in 2000, PSQ has been translated and adapted into several languages for screening OSAS with high sensitivity and specificity.[5] The aim of this study was to translate the PSQ from English into Vietnamese language by following the international translation guidelines.[15] Then, Vietnamese PSQ version was applied to the parents of 60 children aged between 6 and 14 years. None of the parents reported difficulties in understanding any question in the version presented by us. Vietnamese PSQ has a high reliability of the Cronback alpha (0.763) and a significant consistency illustrated by the correlation between individual test items and total scores. Our result was similar to other studies for the reliability of the Spanish, Turkish, Malaysian, Chinese and Portuguese versions of the questionnaire.[8-11] Test-retest reliability of the questionnaire, evaluated by Kappa Agreement test was high, suggesting that the scores remained stable over two weeks. These results allow us to consider that the Vietnamese version of the PSQ is an adequate translation and culturally appropriate adaptation.

Currently, PSG is widely considered to be the gold standard in diagnosing childhood OSAS.[1-3] However, in clinical practice, PSG is very expensive, time consuming and not easy to carry out on children.[1] As a result, such cases require simplified methods.[3-5] In pediatric population, the PSQ is a quick, easy-to-use, highly reliable and consistent test used to evaluate OSAS.[2,5] Early diagnosis, treatment, and adequate follow-up of OSAS are essential to avoid the morbidity associated with this disease.[1-4]

Translation difficulties of this study is the fact that some English words and sentences from the original PSQ were difficult to translate into Vietnamese language (for example question C10: Is “on the go” or often acts as if “driven by a motor”). However, an equivalent translation was identified, and all the parents of participants found questions easy to understand.

The translation study and the cross- cultural adaptation of the PSQ for Vietnamese showed values like those seen in other translations in the world, as well as the original English version, and therefore can be used as a reliable screening test in Vietnam children with suspected OSAS.[5,8-11]

IV. CONCLUSION

In conclusion, the Vietnamese PSQ in this study was shown to be a clinically useful tool to measure sleep disordered breathing in children. In places with difficult access to PSG, PSQ can be a useful tool in the diagnostic suspicion and follow up of children with OSAS.

Conflicts of interest

The authors declare no conflicts of interest.

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