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Validation of pediatric sleep questionnaire translated in Urdu language

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Abstract

Introduction: Obstructive Sleep Apnea Syndrome (OSAS) is an intrinsic sleep disturbance which can have serious health consequences if left untreated. Pediatric Sleep Questionnaire-sleep related breathing disorder (PSQ-SRBD) scale is a valid and reliable tool for screening of patients with a predisposition towards this condition. This study aimed to translate and validate the questionnaire to Urdu language; so that it may be used in clinical settings by pediatricians, orthodontists, general dentists and general physicians alike.

Material and methods: Established guidelines by Beaton et al were used for translation of the questionnaire. Pearson correlation and interclass correlation coefficient were applied to determine test-retest reproducibility. Cronbach alpha and exploratory factor analysis were used to determine the internal consistency and construct validity of the translated questionnaire.

Results: The results showed good test-retest reproducibility. Cronbach alpha was 0.651 indicating high internal consistency.

Conclusions: PSQ-SRBD has been successfully translated and cross-culturally adapted to Urdu language; and has been found to be valid and reliable statistically.

Keywords: Obstructive Sleep Apnea; orthodontists; questionnaire

Introduction

Obstructive sleep apnea syndrome (OSAS) is defined as "an intrinsic sleep disturbance characterized by the appearance of repeated episodes of upper airway obstruction (apneas) occurring during sleep, usually associated to a reduction in oxygen blood saturation."[1] Children with OSA may present with snoring, choking and gasping for breath. Daytime symptoms include sleepiness, hyperactivity, behavioral and learning problems. If left untreated, it can result in impaired growth, cardiovascular dysfunction, poor academic performance and behavioral problems.[2]

It is, therefore, important that children who report to the general physician, pediatrician, general dentist and orthodontist are screened for the presence of OSAS, and parents are made aware of the treatment possibilities and implications if the condition is left untreated. A valuable tool for screening is the Pediatric Sleep Questionnaire (PSQ) which comprises of questions focusing on sleep and lifestyle habits. A concise and validated version of the PSQ called Pediatric Sleep Questionnaire-sleep related breathing disorder scale (SRBD-scale) has 22 questions. It has a positive predictive value of 0.4 and negative predictive value of 0.99. Patients who score more than 33% "yes" responses in PSQ-SRBD

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are at a higher risk of sleep-disorder breathing. [2]

According to previous studies,[3,4] the prevalence of OSA is 1% to 5.8% using objective measurements such as polysomnography and pulse oximetry and it is 7% to 11% based on questionnaire surveys[5,6] of parents. To the best of our knowledge, the prevalence of OSA in pediatric population has not been studied in Pakistani population.

This study aims to translate, cross-culturally adapt and validate the PSQ-SRBD scale in Urdu language, so that it can be used in clinical settings for screening of patients. Furthermore, the translated and validated questionnaire will be a valuable tool for future research on OSA in pediatric Pakistani population.

Material and Methods

PSQ-SRBD scale was used in this study. The questionnaire has 22 questions for evaluation of OSA in pediatric population by evaluation of breathing difficulties, sleep disorders and behavioral problems.

The license for the translation of PSQ-SRBD scale was obtained from the University of Michigan, which reserves the copyrights. Ethical approval for the translation of questionnaire was obtained from the Ethics Review Committee, Margalla Institute of Health Sciences.

Patients of both the genders who were less than 18 years of age were included in the study. Their parents/guardians, who were able to understand Urdu language, signed the informed consent before filling the questionnaire. Patients with a systemic illness or syndrome, neuromuscular disease and chronic respiratory disease were not included in the study. There were 30 patients on whom pretest of the questionnaire was done, this was followed by distribution of questionnaire among 110 participants. The rule of "two to 20 subjects per item ratio" recommended by Kline7[i] was used to calculate the sample size. We chose to select five subjects per item, which resulted in recruitment of 110 children to test the questionnaire.

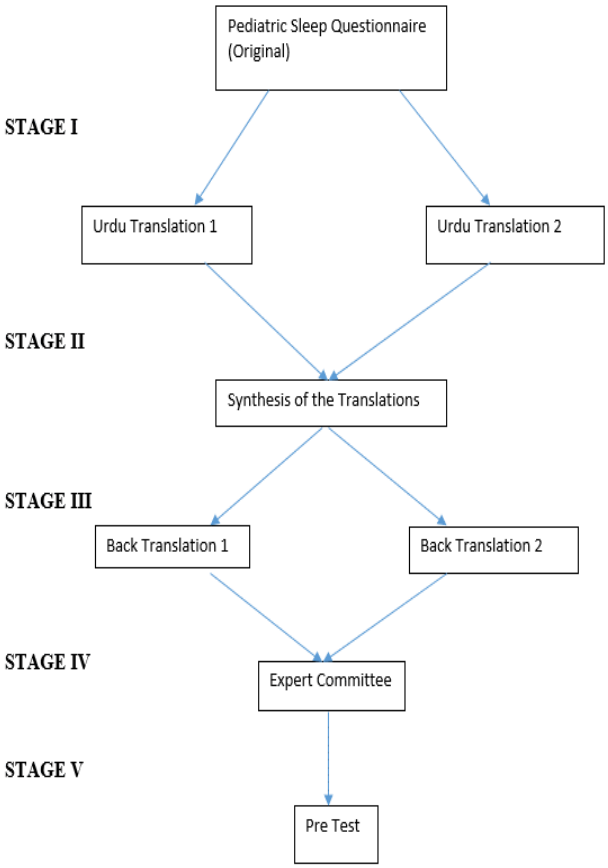

Figure 1: The process of translation and back-translation followed in this study.

Translation:

The translation and cross-cultural adaptation were based on the guidelines of Beaton at al.[8] According to these guidelines, the whole process consisted of five steps. (Figure 1).

STAGE 1

INITIAL TRANSLATION

The first step in the adaptation was the forward translation done by bilingual translators, who had Urdu as their native language and had adequate fluency in English. They produced two independent translations of the questionnaire from English into Urdu.

Translator I: was aware of the purpose of the study and the content of PSQ.

Translator II: was unaware of the concepts being quantified and have no medical or clinical background.

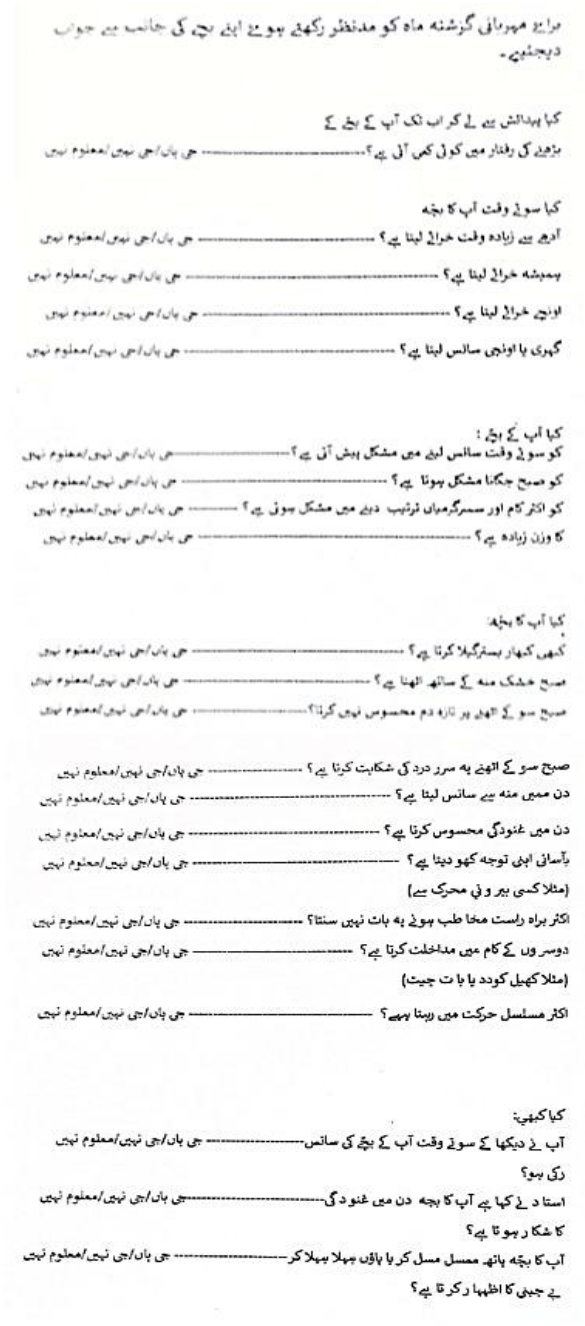

Figure 2: Urdu translation on PSQ-SRBD.

STAGE II

SYNTHESIS OF THE TRANSLATIONS

The two researchers synthesized the results of the two forward translations. They worked on the original questionnaire as well as the first translator's (T1) and the second translator's (T2) versions to produce one common version (T-12). In this process, there was extensive discussion which was documented in the written report.

STAGE III

BACK TRANSLATION:

Two independent translators then translated the agreed T-12 version back into the English language (BT1 and BT2). Both translators were fluent in English and Urdu languages. The two translators did not have medical background and were not aware of the concepts explored.

STAGE IV

EXPERT COMMITTEE:

An expert committee, which included health professionals, language professionals, translators and researchers, reviewed the forward translations (T1 and T2), the common forward translation (T-12, the backward translations (BT 1 and BT 2) and the written report. The committee, after a thorough discussion, developed the pre-final Urdu version of the questionnaire

STAGE V

TEST OF THE PREFINAL VERSION

The pre-final form of PSQ was tested on a sample of 30 participants for pre-testing as recommended by recommerendere Beaton10. All participants were subjected to a structured interview after completion of the PSQ. The purpose of this interview was to inquire about the patient's perception of the purpose and meaning of each question; any difficulties in understanding a single question or layout of the questionnaire. Each subject was asked to answer the questionnaire and was encouraged to point out and discuss any item that was difficult to understand. Subsequently, the Urdu version of PSQ was finalized. (Figure 2).

The questionnaire was distributed among 110 participants, 30 randomly selected participants were asked to fill the Urdu questionnaire again after 2 weeks. SPSS version 26.0 was used for statistical analysis.

Statistical analysis and validation:

The responses of participants were analyzed for test-retest reliability, internal consistency and construct validity using the Statistical Package for the Social Sciences (SPSS) version 26 (SPSS, Inc., Chicago, IL, USA).

Results

There were no major obstacles in translation/back-translation process. The opening statement was written in active voice since it is easier to understand. In place of "?" words "معلوم نہیں"were included. There was a lengthy discussion on the translation of Question 10 where the word choices were "تھکاوٹ" (tiredness) and "تازہ دم محسوس نہیں کرتا"" (feels unrefreshed). The later was chosen, since it was closer to the original version. For Question 11, there was discussion for the choice of words between "سستی" (laziness) and "غنودگی" (sleepiness). Again, the later was chosen since it was closer to the original version. Question 20 was particularly difficult to translate, the closest expression to "fidgets with hands and feet or squirms in seat" was translated to ہاتھ مسل مسل کر یا پاؤں ہلا ہلا کر بے چینی کا اظہار کرتا ہے, and it was back translated as "Expresses restlessness by rubbing hands and shaking feet while sitting". The phrase "Driven by a motor" became " مسلسل حرکت میں رہتا ہے" (constantly moves).

The questions from the original version were rearranged so that they became easier to read and comprehend. During pre-test, there were no questions raised from parents who filled the questionnaire.

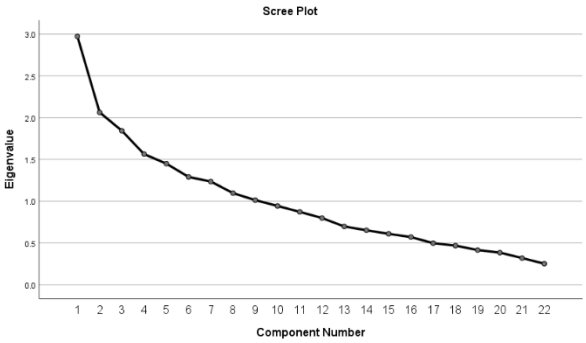

Figure 3: Factor analysis of principal components, scree plot of Eigen values. Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser Normalization.

Table I: Descriptive statistics for items of Urdu-SRBD. (n=110)

		"Items"	"Yes"n %)	"No" n (%)	"Don't Know" n (%)
1	"B9"	"Did your child stop growing at a normal rate at any time since birth"	15 (13.6%)	93 (84.5%)	2 (1.8%)
2	"A2"	"Snore more than half the time"	13 (11.8%)	92 (83.6%)	5 (4.5%)
3	"A3"	"Always snore"	6 (5.5%)	100 (90.9%)	4 (3.6%)
4	"A4"	"Snore loudly"	5 (4.5%)	102 (92.7%)	3 (2.7%)
5	"A5"	"Have "heavy" or loud breathing"	22 (20%)	79 (71.8%)	9 (8.2%)
6	"A6"	"Have trouble breathing, or struggle to breathe"	6 (5.5%)	100 (90.9%)	4 (3.6%)
7	"B6"	"It is hard to wake your child up in the morning"	49 (44.5%)	61 (55.5%)	-
8	"C5"	"Has difficulty organizing tasks and activities"	30 (27.3%)	76(69.1%)	4 (3.6%)
9	"B22"	"Is your child overweight"	11 (10%)	92 (83.6%)	7 (6.4%)
10	"A32"	"Occasionally wet the bed"	18 (16.4%)	92 (83.6%)	-
11	"A25"	"Have a dry mouth on waking up in the morning"	32 (29.1%)	66 (60%)	12 (10.9%)
12	"B1"	"Wake up feeling unrefreshed in the morning"	28 (25.5%)	73(66.4%)	9(8.2%)
13	"B7"	"Does your child wake up with headaches in the morning"	15 (13.6%)	94(85.5%)	1(0.9%)
14	"A24"	"Tend to breathe through the mouth during the day"	35 (31.8%)	61(55.5%)	14(12.7%)
15	"B2"	"Have a problem with sleepiness during the day"	8 (7.3%)	96 (87.3%)	6 (5.5%)
16	"C8"	"Is easily distracted by extraneous stimuli"	24 (21.8%)	80(72.7%)	6(5.5%)
17	"C3"	"Does not seem to listen when spoken to directly"	29(26.4%)	76(69.1%)	5(4.5%)
18	"C18"	"Interrupts or intrudes on others"	48 (43.6%)	57 (51.8%)	5(4.5%)
19	"C14"	"Is "on the go" or often acts as if driven by a motor"	57(51.8%)	48(43.6%)	5(4.5%)
20	"A7"	"Stop breathing during the night"	8 (7.3%)	99 (90%)	3 (2.7%)
21	"B4"	"Has a teacher commented that your child appears sleepy during the day"	3(2.7%)	103(93.6%)	4(3.6%)
22	"C10"	"Fidgets with hands or feet or squirms in seat"	12 (10.8%)	94(84.7%)	5(4.5%)

Table II: Interclass Correlation Coefficient and Pearson correlation coefficient for PSQ-U administered at 02 weeks interval.

Item	Pearson Correlation r	Internal Correlation Coefficient
1	0.426	0.667
2	0.705	0.660
3	0.623	0.624
4	0.541	0.785
5	0.833	0.581
6	0.755	0.837
7	1	1
8	0.577	0.694
9	0.577	0.632
10	0.645	1
11	0.535	0.732
12	0.501	0.597
13	0.592	0.751
14	1	1
15	1	1
16	1	1
17	0.893	0.920
18	1	0.561
19	0.426	0.597
20	1	0.843
21	0.623	0.732
22	1	1

Characteristics of the study population:

The questionnaire was filled by 110 parents. At the time of receiving the questionnaire back, it was checked for any missing responses and was returned, if any were found. Thus, the participation was 100%. The mean age of patients was 10.12 ± 4.15 years. Minimum age was 2 years and maximum was 17 years. There was an almost equal gender distribution; 51 (42.5%) participants were males and 59 (49.2%) participants were females. Descriptive data of all Urdu-SRBD items are presented in Table I.

Reliability:

Test-retest reproducibility: To determine test-retest reliability interclass correlation coefficient and Pearson correlation tests were applied. Results are shown in Table II.

Internal consistency: Cronbach alpha was 0.651 indicating high internal consistency of the translated questionnaire. Individual Cronbach alpha scores of PSQ-SRBD domains are shown in Table III.

Validity:

The construct validity of the translated questionnaire was determined by exploratory factor analysis. Bartlett's test of sphericity was applied to determine the presence of correlations among the variables, and to determine sampling adequacy Kaiser-Meyer-Olkin (KMO) index was applied. The calculation of the KMO index was 0.566, since the value was higher than 0.5 sampling adequacy was confirmed. Bartlett's test of sphericity was significant (c2 ¼ 430.975; df ¼ 231; $p < 0.05$), indicating that the correlation matrix is suitable for factoring.[9] There were nine factors extracted by principal component analysis before rotation. Eigen value of these factors was greater than 1, and they accounted for 66.02% of the cumulative variance. After rotation the following criteria was

Table III: Internal consistency of PSQ domains

Domain	Cronbach alpha
Snoring (4 items)	0.623
Sleepiness (4 items)	0.516
Behavior (6 items)	0.517

applied to determine the factors to be included: Eigen value more than 1, scree plot (Figure 3) (extracted factors must be before inflection) and a predetermined number of factors based on previous studies.[10-13]We took these considerations into account and extracted four factors which were named in accordance to the original questionnaire.[9]

There were a few differences between the loadings of the original questionnaire and the translated version. In the original version, items B1and B6 belonged to "other", B2 to "sleepiness" and B7 to "breathing". B4 belonged to "sleepiness" and B22 to "other". A2, 3, 4 and 25 belonged to breathing. C18 belonged to "behavior". Factor loadings of the translated version are shown in Table

Table IV: Factor structure of Urdu PSQ-SRBD questionnaire. Items in bold represent the highest loading as in the original version. Items in italic represent the highest loading on factors other than the original.

		Factor 1 Breathing	Factor 2 Behavior	Factor 3 Sleepiness	Factor 4 Other
"A5"	"Have "heavy" or loud" breathing	0.390			
"A6"	"Have trouble breathing, or struggle to breathe"	0.506			
"A7"	"Stop breathing during the night"	0.502			
"A24"	"Tend to breathe through the mouth during the day"	0.407			
"B1"	"Wake up feeling unrefreshed in the morning"	0.375			
"B2"	"Have a problem with sleepiness during the day"	0.438			
"B7"	"Does your child wake up with headaches in the morning"	0.462			
"B6"	"It is hard to wake your child up in the morning"	0.407			
"C8"	"Is easily distracted by extraneous stimuli"		0.390		
"B4"	"Has a teacher commented that your child appears sleepy during the day"		0.655		
"C10"	"Fidgets with hands or feet or squirms in seat"		0.480		
"C5"	"Has difficulty organizing tasks and activities"		0.425		
"B22"	"Is your child overweight"		0.514		
"A2"	"Snore more than half the time"			0.626	
"A3"	"Always snore"			0.620	
"A4"	"Snore loudly"			0.737	
"A32"	"Occasionally wet the bed"				0.520
"A25"	"Have a dry mouth on waking up in the morning"				0.237
"C14"	"Is "on the go" or often acts as if driven by a motor"				0.294
"C3"	"Does not seem to listen when spoken to directly"				0.568
"C18"	"Interrupts or intrudes on others"				0.447
"B9"	"Did your child stop growing at a normal rate at any time since birth"				0.390

Discussion

Recent years have seen an increase in the number of international health research projects, necessitating the translation of health status measures to languages other than the source language. PSQ-SRBD is a valid and reliable tool exhibiting high sensitivity and specificity. It has previously been translated

to various other languages [14-20]. This study aimed to translate the questionnaire to Urdu language which is the eleventh most widely spoken language in the world, with more than one billion people worldwide who can speak it.[21]

In the translation process, international guidelines for translation and cross-cultural adaptation were followed as laid down by Beaton et al.[10] Question items C10 and C14 were particularly difficult to translate, which was similar to other translations.[16,17] However, an equivalent translation was identified for both the items; the participants did not find any difficulty in filling the questionnaire.

Results of reliability analysis showed an adequate value of Cronbach alpha 0.651, which is considered moderate to good, but it was less than that reported by Chervin et al[9] and Yuksel et al[19] because of a different sample population. In both these studies, parents of children with symptoms of sleep disordered breathing filled the questionnaire, who were generally expected to have a better understanding of SDB symptoms, thus giving more valid and reliable responses. Similar reason can be attributed to lesser Cronbach alpha values of the PSQ subscales. As both the overall Cronbach alpha value and the subscale values lied in the moderate to good range (0.50-0.75), and the test-retest Pearson correlation values were moderate to high, the Urdu-SRBD scale is considered reliable.

Factor analysis showed that the translated questionnaire could be divided into same domains as the original questionnaire by Chervin et al i.e. “breathing”, “behavior”, “sleepiness” and “other”. The distribution of a few items was different but such differences were also observed in the French and Chinese translation. These differences can be attributed were to linguistic, cultural and contextual specificities. The other translations and cross-cultural adaptations did not evaluate factor analysis for construct validity.

To sum it up, the Urdu-PSQ is a valid and reliable tool that can be used by dentists, orthodontists and pediatricians for identification of children at high risk of OSA. The gold standard for diagnosis is polysomnography, but it is not readily available, expensive and difficult to conduct in children. Therefore, PSQ-SRBD can serve as a valuable screening tool.

There were a few limitations of the study. Psychometric properties were not evaluated for populations belonging to different age groups, socio-economic status and literacy rate. Another important limitation was that the translated questionnaire was not tested in the population with OSA. In the development of original questionnaire, the ratio of participants who had OSA to healthy individuals was 1:2, whereas in our study only 13 of 110 participants had snoring. The number of participants with diagnosed OSA had a better understanding of signs and symptoms as compared to participants without symptoms. Future studies should verify the psychometric properties of this instrument in different population groups.

Conclusions

In conclusion, PSQ-SRBD by Chervin et al[9] has been successfully translated and cross-culturally adapted to Urdu language. It has been found to be statistically valid and reliable, indicating that it can be used as a screening tool for SDB in Urdu speaking pediatric populations.

The PSQ-SRBD has been translated according to the established guidelines and has been statistically validated, thus it is recommended that the instrument is used in academic and clinical settings as a baseline investigation to screen pediatric population for obstructive sleep apnea

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