ORIGINAL ARTICLE

Reliability and Validity of Persian Version of "BEARS" Pediatric Sleep Questionnaire

Mahmoud Mohammadi, Ebrahim Amintehran, Mir Farhad Ghaleh-bandi, Mahmoud Reza Ashrafi, Shervan Shoaee, Babak Ghalehbaghi

Tehran University of Medical Sciences / Department of Neurology, Children's Medical Center, End of Keshavarz Boulevard, Dr. Gharib's St. Tehran, IRAN

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Abstract

Objective: To determine the reliability and validity of Persian version of "BEARS" (B=Bedtime Issues, E= Excessive Daytime Sleepiness, A=Night Awakenings, R=Regularity and Duration of Sleep, S=Snoring) pediatric sleep questionnaire.

Setting: Two primary care pediatric clinics in Tehran, IRAN

Methods: In the first step BEARS sleep questionnaire filled and in a 2 to 4 week period BEARS completed again (by another questioner) and all of the subjects visited by sleep specialists for diagnosis of sleep problem. To determine test-retest reliability findings of BEARS compared during the time and between different questioners. To determine criteria validity, findings of BEARS compared with experts' diagnosis.

Results: A total of 215 children (2-12 years old) were studied. From these 101 were in preschool age group (2-6 years old) and 114 in primary school age group (7-12 years old). All of the BEARS items in preschool age group and most of the items in school aged group had good to excellent test-retest reliability ($P<0.05$). Approximate to half of items in both age groups were valid ($P<0.05$).

Conclusion: This study suggests that the use of BEARS (a simple brief screening tool for pediatric sleep problems) is a reliable and relatively valid sleep screening tool in children especially in Persian language.

Keywords: Children, Sleep, Sleep disorders, Pediatric Sleep Questionnaire, Screening tools; Primary care.

Introduction

Sleep disturbances in children represent highly common phenomena that, in severe forms, can interfere with daily patient and family functioning. It is estimated that upwards of 25% of children experience a significant sleep problem at some point during childhood [1].

Numerous studies have shown that clinical sleep disorders are associated with significant morbidity, functional impairment, decreased quality of life, and substantial direct and indirect economic costs [2-4]. Despite this empirical evidence, inadequate attention is often paid by medical professionals to sleep disorders and their serious health consequences [5]. Interest in pediatric sleep problems continues to increase, yet further investigation is needed to develop empirically

Address for correspondence:

Mahmoud Mohammadi

Professor of Child Neurology, Tehran University of Medical Sciences / Department of Neurology, Children's Medical Center, End of Keshavarz Boulevard, Dr. Gharib's St. Tehran, IRAN

based detection and treatment of pediatric sleep disorders.

Although many sleep problems in infants and children are transient and self-limited in nature, certain intrinsic and extrinsic risk factors such as difficult temperament, chronic illness, and maternal depression may predispose some children to develop more chronic sleep disturbances [6]. The consequences of untreated sleep problems may include significant emotional, behavioral, and cognitive dysfunction [7-12]. The impact of childhood sleep problems is further intensified by their direct effect on parents' sleep, resulting in parental daytime fatigue, mood disturbances, and a decreased level of effective parenting [13].

It is clear that pediatric sleep problems meet most of the criteria for clinical screening procedures, including high prevalence, significant clinical impact, natural history that may be affected by screening and intervention, and the availability of acceptable and effective treatments. Therefore, it is important for primary care providers to screen sleep disorders in children and adolescents during routine health encounters [6]. Despite the magnitude and clinical importance of sleep issues, several studies have documented that there is a low level of recognition of sleep disorders by primary care physicians in both adults [14–15] and children [16,17].

Although history taking is the single most important step in identifying the type and source of the sleep problem [18], but use of brief screening tools is key point of application of screening services by health care providers. Recently, a study has demonstrated that the use of simple screening tool, such as BEARS' pediatric sleep questionnaire appears to be a user-friendly pediatric sleep screening tool which significantly increases the amount of sleep information recorded as well as the likelihood of identifying sleep problems in the primary care setting [6].

Because no similar pediatric sleep screening tools have been empirically tested in Persian language, the purpose of the following study was to evaluate the reliability and validity of "BEARS" pediatric sleep questionnaire in identifying sleep problems in a primary care setting in Iran.

Methods

Subjects

This study was conducted in two primary care pediatric clinics in Tehran, which serve primarily middle-income population. Each clinic has approximately 8,000 -10,000 primary care visits per year. Study subjects were a convenience sample of patients between the ages of 2 and 12 years who visited for general medical problems with no sleep compliant over the 6 months period between April and September 2006. Subjects were included randomly if their parents accepted to cooperate.

Bears Sleep Questionnaire

The BEARS is a pediatric screening tool developed by the investigators of Brown University School of Medicine, Rhode Island Hospital, USA. (Table-1)

It was designed to address the most common sleep issues in toddlers, preschoolers, and school aged children. It incorporates five basic sleep domains: **B**edtime Problems, including difficulty going to bed and falling asleep; **E**xcessive Daytime Sleepiness, which includes behaviors typically associated with daytime somnolence in children; **A**wakenings during the night; **R**egularity of sleep/wake cycles (bedtime, wake time) and average sleep duration; and **S**noring. These domains are felt to reflect the most common presenting sleep complaints in children.

BEARS questionnaire translated to Persian by primary investigators and revised primarily by 2 people who were fluent in both English and Persian languages and then by a child neurologist, a psychiatrist, and an otolaryngologist who were expert in diagnosis and treatment of sleep disorders.

Data collection

In the first visit a written agreement was taken from parents, and then BEARS questionnaire in five domains asked by a general pediatrician. To determine test-retest reliability BEARS questionnaire filled again for each subject in 2 till 4 week period by a nurse practitioner. To determine item validity of BEARS all of the subjects were visited by a child neurologist and a psychiatrist who were expert in the field of pediatric sleep disorders. These experts determined the presence or absence of

sleep problem by taking a complete history in each domain of BEARS questionnaire for each subject. Experts' diagnoses considered as gold standard of sleep problem and frequencies of sleep problems in each item of BEARS compared with experts' opinion.

Sample Size

Approximate to 96 subjects in each pre-school age (2-6 years old) and primary school age (7-12 years old) group were needed to participate.

Analyses

Data were entered into the SPSS version 15.0. Descriptive statistics were used to describe frequency counts and means. To determine test-retest reliability McNemar test (P<0.05 significant) and kappa correlation coefficient (>0.6 good agreement) used to compare nominal qualitative variables, and Cronbachs alpha correlation coefficient (>0.8 good agreement) used to compare scale variables. Logistic regression used to examine the item validity (P<0.05 significant).

Results

A total of 215 children (2-12 years old) had both screening with BEARS and also visited by sleep specialists. From these subjects 101 were in preschool age group (2-6 years old); 49 female (48.8%) and 52 male (51.5%), and 114 were in primary school age group (7-12 years old); 58 female (50.9%) and 56 male (49.1%). The average age in preschool age group was 52.19 (+/-15.07) months old and in primary school age group was 107.13 (+/-19.34) months old.

In table-2 the percentages of probable or definite problems in each domain of BEARS questionnaire are compared between preschool and school-aged groups, for this purpose Chi square test is used (P<0.05 considered significant). Bedtime problems, regularity and duration of sleep, and sleep-disordered breathing were significantly greater in preschool age group (P <0.05). Excessive daytime sleepiness was significantly greater in school age group (P <0.05). There was no significant difference in awakening during the night domain between two groups.

To determine test-retest reliability by assumptions of

Table -1: BEARS Sleep Questionnaire

Domain of BEARS	Preschool (2–6 years)	School-aged (7–12 years)
Bedtime problems	Does your child have any problems going to bed? (**A1**) Falling asleep? (**A2**)	Does your child have any problems at bedtime? (P) (**B1**) Do you have any problems going to bed? (C) (**B2**)
Excessive daytime sleepiness	Does your child seem over tired or sleepy a lot during the day? (**A3**) Does she still take naps? (**A4**)	Does your child have difficulty waking in the morning? (**B3**), seem sleepy during the day? (**B4**) or take naps? (P) (**B5**) Do you feel tired a lot? (C) (**B6**)
Awakenings during the night	Does your child wake up a lot at night? (**A5**)	Does your child seem to wake up a lot at night? (**B7**)Any sleepwalking? (**B8**) or nightmares? (P) (**B9**) Do you wake up a lot at night? (**B10**) Have trouble getting back to sleep? (C) (**B11**)
Regularity and duration of sleep	Does your child have a regular bedtime and wake time? (**A6**) What is your child regular bed time? (**A7**) What is your child regular wake time? (**A8**)	What time does your child go to bed? (**B12**) and get up on school days? (**B13**) What time does your child go to bed? (**B14**) and get up on weekends? (**B15**) Do you think he/she is getting enough sleep? (P) (**B16**)
Sleep-disordered breathing	Does your child snore a lot? (**A9**) or have difficulty breathing at night? (**A10**)	Does your child have loud or nightly snoring? (**B17**) or any breathing difficulties at night? (P) (**B18**)

B, bedtime problems; E, excessive daytime sleepiness; A, awakenings during the night; R, regularity and duration of sleep; S, sleep-disordered breathing; P, Parent C, Child.
A1-A10, screening questions in pre-school aged children
B1-B18, screening questions in school aged children

kappa coefficient >0.6 and Cronbachs alpha>0.8; there were good to excellent agreement in all of the BEARS items in preschool age group, in school-aged children there were not enough agreement in 3 of 18 BEARS items (B5, B8, B11), the remaining items in school aged group had good to excellent agreement.

Logistic regression used to examine the item validity of each BEARS questions in comparison to the experts' opinion as gold standard of sleep problem in each subject. In preschool aged children; items A1, 5, 6, 9 were valid (P<0.05) and A2, 3, 4, 10 were not (P>0.05), items A7, A8 were not analyzed for validity because these items related to times of going to bed at night and getting up in the morning which calculation of validity was not meaningful for them. In school-aged children; items B2, 3, 5, 7, 8, 10, 17, 18 were valid (P<0.05) and items B1, 4, 6, 9, 11, 16 were not (P>0.05), items B12-15 were not analyzed for validity because of the previously explained reason.

Discussion

The results of this study suggest that the use of Persian version of BEARS sleep screening questionnaire is greatly reliable to prompt primary care providers in initial diagnosis of sleep problems in children and it also is relatively valid for this purpose. It is important to remember that subjects who screened in this study had come to primary care visits for another medical conditions with no sleep compliant, and at the end it cleared that a significant number of these children had hidden sleep problems (Table-2): bedtime problems 21.05%-56.44%, excessive daytime sleepiness 26.73%-42.98%, awakening during the night 13.86%-32.46%, regularity and duration of sleep 17.54%-27.72%, sleep-disordered breathing 10.53%-17.82%. These high frequencies in children explains the importance and burden of sleep problems in this age group which are not noticed by primary care providers in Iran and inadequate attention to them may have negative consequences on a host of functional domains, including mood, behavior, school performance, and health outcomes.

Furthermore, the percentage of subjects identified as having sleep problems in some domains of BEARS during screening visits were similar in our study to the prevalence of those same problems cited in the literature. For example, a number of studies have suggested that

Table 2: Comparison of percentages of sleep problems in each domain of BEARS questionnaire among preschool and school - aged groups

Domain of BEARS questionnaire	Preschool (2–6 years) %	School-aged (7–12 years) %	P value*
Bedtime problems	56.44%	21.05%	0.00
Excessive daytime sleepiness	26.73%	42.98%	0.02
Awakenings during the night	13.86%	32.46%	0.54
Regularity and duration of sleep	27.72%	17.54%	0.00
Sleep-disordered breathing	17.82%	10.53%	0.00

*Chi square test used to compare percentage of sleep problems in preschool and school-aged children in Iran.

the prevalence of bedtime resistance in early school-aged children is in the range of 15% [13] to 27% [19], which is similar to 21% in Iranian sample. Similarly, the percentage of children identified by the BEARS as having significant snoring (10.53%-17.82%) was similar to the prevalence of frequent snoring for that age group reported in previous studies [6,20-24].

In addition, comparison of percentages of probable sleep problems in each domain of BEARS questionnaire between preschool and school-aged groups indicates bedtime problems, regularity and duration of sleep, and sleep-disordered breathing were significantly greater in preschool age group (P <0.05). The authors suppose these differences are mainly due to (1) absence of discipline in ordinary life (bedtime problems, and regulation and duration of sleep), and (2) more activity of lymphatic system and hypertrophy of adenoids and tonsils (sleep disordered breathing) in preschool aged children. Excessive daytime sleepiness was significantly greater in school age group (P <0.05); may be due to obligation to early wake up times in the morning which is not compatible with their biological circadian rhythms.

In section of test-retest reliability; there were good to excellent agreement in all of the BEARS items in preschool aged group and this degree of reliability is a criterion which makes BEARS an appropriate screening tool. In school-aged group there were not enough agreement in 3 of 18 BEARS items (B5, B8, B11), the remaining items in school aged children had good to excellent agreement. It seems in B5 (Does your child take naps during the day?) and B9 (Does your child have any nightmares?) there were some misunderstanding by parents and it is better these items questioned directly from children (to decrease information and recall biases), and in B11 (Do you have trouble getting back to sleep?) purpose of the item has not been obvious for children and authors suggest to revise the role of this item in BEARS questionnaire.

Our experts concluded that BEARS does not have desirable content validity in diagnosis of narcolepsy, sleep terror disorder, and other parasomnias which is very similar to beliefs of questionnaire designers [6].

To determine item validity of BEARS all of the subjects were visited by a child neurologist and a psychiatrist and these experts' opinion considered as gold standard of sleep problem in each subject. In preschool group 4 of 8 nominal items had desirable validity (A1,5,6,9) and 4 of 8 did not have good agreement (A2,3,4,10). In school aged group 8 of 14 nominal items had desirable validity (B2,3,5,7,8,10,17,18) and 6 of 14 nominal items did not have good agreement (B1,4,6,9,11,16). Interestingly, in both age groups for all of the questions which did not find to be valid, the odds ratios were greater than 1 which means there is relative association between screening results and experts' diagnoses.

We believe following factors are the major ones which have influenced validity of BEARS items: (1) invalid items had more subjective characteristics and as a result associated with more recall biases, (2) may be the design of BEARS is so that there are some overlaps between concepts of each item which leads to its vagueness and decreased level of validity, (3) final diagnosis in this study is based on experts' opinion which might lead to some inaccuracy in diagnosis, and (4) small sample size which has led to greater type II error.

In conclusion, this study suggests that the use of BEARS (a simple brief screening tool for pediatric sleep problems) is a reliable and relatively valid tool in Persian language for identifying parents' concerns about their children's sleep and use of the BEARS or other similar questionnaires is highly recommended to primary care providers in Iran.

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