

Study of Sleep Disorders among Young Children Using Hindi Translated and Validated Version of Pediatric Sleep Questionnaire

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ABSTRACT

Objective: The objective of this study is to assess the prevalence of sleep disorders among children aging between 4 and 9 years using Hindi version of Pediatric Sleep Questionnaire (PSQ). **Methods:** This study had two parts first, translation and validation of PSQ into Hindi language, and second, assessment of the prevalence of sleep disorders using PSQ Hindi version. Hindi PSQ was distributed in randomly chosen primary schools in a semi-urban area. The children were requested to get them filled by their parents. When the questionnaires were returned, responses were analyzed. **Results:** Most of the items of the Hindi version had perfect agreement with original questionnaire in a bilingual population ($\kappa = 1$). Totally, 435 children were included in the field study having average age of 6.3 years. Obstructive sleep apnea was reported in 7.5% children; symptoms suggestive of restless legs syndrome were reported by 2%–3%; teeth grinding by 13.9% and sleep talking by 22.6% children. **Conclusion:** PSQ Hindi version is a validated tool to screen for sleep disorders among children. Sleep disorders are fairly prevalent among young children in India.

KEYWORDS: Child, obstructive sleep apnea, restless legs syndrome, sleep-wake disorders

INTRODUCTION

Sleep disorders are not uncommon among school children, and it has been found the primary school children suffer from various sleep disorders, for example, difficulty falling asleep, restless sleep, teeth grinding, and daytime sleepiness.^[1] Cultural and geographical differences have been observed in the prevalence of sleep disorders, sleep schedule, and the reasons that lead to daytime sleepiness among children.^[1] Although the sleep disorders are common, still it has been found that many a times, parents remain oblivious of their child's sleep problems.^[2] It has been reported that children from the Asian countries sleepless as compared to Western countries.^[1,3] Sleep deprivation has also been reported among children, especially with relation to the homework schedule.^[4,5] Diagnosis of sleep disorders and sleep deprivation is important in children as they have been found to be associated with daytime napping, cardiovascular morbidity, attention deficit hyperactivity disorder (ADHD), and obesity.^[6-8]

Indian data using the sleep questionnaires suggests that around 13% of toddlers have sleep problems, most common being the night awakenings.^[9] Another study reported that among 3–10 years old children, 43% had some kind of sleep disorder.^[10] The most common disorder has been the nocturnal enuresis followed by sleep talking and bruxism.

A number of questionnaires have been developed to assess sleep disorders in children. These include Children Report of Sleep Habits (CRSH),^[2] Children's Sleep Habits Questionnaire (CSHQ),^[11] and Pediatric Sleep

Questionnaire (PSQ).^[12] Among these, CRSH is the self-reporting questionnaire, while the latter two are to be responded by the parents. A review of various sleep questionnaires has reported that PSQ-sleep disordered breathing subscale is a validated tool and possess' all psychometric properties. Of all the questionnaires, CSHQ has already been translated in Hindi.^[13] However, CSHQ does not provide any diagnosis. Hence, the objective of this study was to assess sleep disorders among children falling in the age group of 4–9 years, especially the obstructive sleep apnea (OSA) using Hindi translation of PSQ.

METHODS

This study was done after obtaining permission from the Institutional Ethics Committee. It had two parts first, the translation of PSQ in Hindi and second, assessment of sleep disorders in children using the Hindi version.

Translation of Pediatric Sleep Questionnaire

This questionnaire was developed by Chervin *et al.*^[14] It has 69 items that address various issues related to child's

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sleep that range from sleep onset difficulty, insomnia, restless legs syndrome (RLS), snoring, excessive daytime sleepiness, parasomnias, and daytime behavioral symptoms of hyperactivity and inattention. Most of the items are to be scored on three points-yes/no or do not know by the parents.

One of its subscales for sleep related breathing disorder (SRBD) has been validated for the diagnosis of sleep apnea.^[12] The 22-item SRBD subscale has been found to correctly classify 85% cases with sensitivity of 85% and specificity of 87%. This scale has been translated into many languages including Malay, Spanish, Portuguese, and Turkish.^[15-18]

The translation of the questionnaire was done according to the standard guidelines. After obtaining the permission from the author of original instrument, original English version was procured (V0). Then, two bilingual translators translated it into Hindi independently (V1 and V2). Both the Hindi versions were compared with each other, and a common Hindi version was reached (V3). This was back-translated into English by two independent English translators (V4 and V5). A common English version was framed after discussion regarding the terminologies (V6). This was compared with the original version (V0) for the gross inconsistencies by the team if any. Wherever gross technical inconsistencies were found, appropriate changes were made in V3, and another Hindi version V7 was reached. This was tested in a small set of parents ($n = 7$) who had children falling between 3 and 12 years for the ease of understanding. They were asked to provide information regarding sleep of their children and also to report any difficulty in understanding the questionnaire. If they suggested any difficulty in understanding any item/word, it was discussed with them, and necessary changes in terminology were made, wherever required. This leads to a Hindi version that was then considered as a final version-V8.

Finalized Hindi version (V8) was tested in a small set of bilingual parents (22 in number). First, they were asked to provide information regarding sleep of their child according to final Hindi version (V8). After 5 days, they were given the original English version of the questionnaire. Responses from both the versions were correlated for the concordance.

Assessment of prevalence of sleep disorders

This study was conducted in the primary schools of the semi-urban area. List of schools located in the area was prepared, and from this list, schools were selected randomly. One of the authors reached the school authorities and explained them the rationale of the study. After obtaining permission from the competent authority, they were delivered the validated Hindi version of PSQ. This was distributed in the classes starting from lower kindergarten to Class IV, i.e., the children falling in the age group of 4–9 years. They were asked to get it filled by their parents.

With each questionnaire, a page for obtaining parent's informed consent was attached that was to be signed by the parents. Parents were given 5 days to return the completed questionnaire. Completed questionnaires were collected from school and data were analyzed.

Anthropometric measurements were obtained from the school records.

Statistical analysis

Statistical analysis was done using SPSS version 22.0 (Released 2013. IBM SPSS Statistics for Windows, version 22.0. IBM Corp., Armonk, NY, USA). For the validation of the PSQ, kappa was calculated for each item comparing the agreement between English and Hindi version. For the data gathered from the school children, descriptive statistics was calculated.

RESULTS

Translation process of the scale in Hindi was made difficult by various cultural issues. In Hindi, we did not have expression for some of the phrases mentioned in original English version. For example, original version mentions “growing pains” in item numbers A13a and A13b. Since this did not have adequate translation in Hindi, after the consensus, another term which is given in original instrument “unexplained leg pains” was used, and it was translated as “*akaaran dard*.” Other terminologies where the alternate terminologies were used are depicted in Table 1. The kappa suggested a perfect agreement for most of the items of the scale [Table 2]. Item A15 had worst agreement, and hence, it was revised in the Hindi translation after consultation with participants.

A total of 560 forms were distributed; out of which, 482 were returned (response rate = 86%). Out of these 482 forms, 47 forms had missing responses on 5 or more items, hence, they were excluded from the study. Thus, in the final analysis, 435 forms were included in the study.

The average age of subjects included in this study was 6.36 ± 1.61 years. This sample was dominated by girls (60.64%). Mean sleep latency in this group was 11.69 ± 9.14 min. None of the forms that were returned disclosed any medical condition among any of the participants.

4.14% children had difficult bedtime routine. Difficulty in falling asleep was reported in 1.93% children. Two or more awakenings in the night were reported in 3.01% children, and 1.94% had difficulty in falling asleep again. Early morning awakening was reported in 3.43% children. 6.38% children complained of nonrefreshing sleep, and napping was reported in 30.34% children. 30.34% children consumed caffeine during the day. Frequent change in bedtime was reported in 5.49% and a frequent change in wake time was observed by parents of 4.95% children. Table 3 depicts prevalence of various sleep disorders and their symptoms.

DISCUSSION

This study suggested that sleep disorders are not uncommon in young school children. SRBD was reported in approximately 8% children, and at least, one out of three children was wetting the bed. “Restless legs” and “growing pains” were reported in 6% and 10% children, respectively. Among parasomnias, teeth grinding was most common, reported in 14% children. Hypersomnia and caffeine consumption was also common among young children. Thus, this study underlines the need for focusing our attention to the sleep of children.

Table 1: Hindi translation of English terminologies in Pediatric Sleep Questionnaire-Hindi version

Item number	Original term	Hindi translation	Back translation	Final Hindi translation
A14	Kick	Jhatka	Jerk	Jhatka
A15	Pajamas	Uske kapde	His cloths	Uske kapde
A17a	Average	Lagbhag	Approximately	Lagbhag
A24	Tend to breathe through the mouth during the day	Din mein bhi munh se saans leta hai	During the day as well breathes through mouth	Din mein munh se saans leta hai
A27	Upset stomach	Pet mein dikkat	Discomfort in abdomen	Pet mein dikkat
A29	Get a burning feeling	Jalan batata hai	Reports a burning sensation	Jalan batata hai
A 37	Ever been moving	Kabhi aisi harkat	Ever done such activity	Kabhi aisi harkat
A42	Difficult routines or rituals	Vishesh prakriya	Specific method	Vishesh reeti/niyam
A52	Get out of bed on weekend or vacation mornings	Saptah ke ant mein ya chhuttiyon ke dauraan uthta hai	Wakes up at weekends or during holidays	Saptah ke ant mein ya chhuttiyon ke dauraan subah uthta hai
B2	Sleepiness during the day	Din bhar neend main rahta hai	Whole day	Din bhar neend main rahta hai

Table 2: Kappa values of items of Pediatric Sleep Questionnaire-Hindi version

Kappa value	Agreement	Item numbers
1	Perfect	SRBD sub-scale - A1, A9, A12, A13, A13a, A13b, A14a, A16, A17, A22, A23, A27, A29, A30, A33, A34, A35, A40, A42, A43, A44, A45, A46, A47, A48, B2, B5, B8, B10, B11, B12, B12a, B13, B15, B17, B18, B19, B20, B22a, B23, B24, B25, ADHD Items
0.8	Very good	A14, A36
0.64	Good	A8, A11, A37
0.5	Moderate	A21
0.32	Fair	B16
-0.07	Worse	A15

SRBD: Sleep related breathing disorder

Earlier studies have reported that sleep disorders are not uncommon among school children. At the age of 4 years, 19% children have been found to suffer from sleep disorders with insomnia being the most prevalent of all, reported in 17% of the subjects.^[19] Another study has reported that insomnia and nightmares were the most prevalent sleep disorder among children who have just joined the school, having reported by 15% and 14% study sample.^[20] An Indian study involving children falling between 1 and 3 years suggested that 81% had 1–3 awakenings at night and 13% were suffering from various sleep disorders.^[9] Our results are more or less comparable with the data from other studies except the snoring, which has been reported by small group in the present study. Earlier it has been found that around 39% children snore with 4% having habitual snoring.^[21] That study reported that habitual snoring was associated with restless sleep, witnessed pauses in breath during sleep and mouth breathing, and hyperactivity during the daytime.^[21] Furthermore, sleep disorders and poor sleep have been found to impair academic performance and to produce symptoms similar to ADHD.^[21-23] Thus, sleep-related symptoms should not be ignored among children.

We found that sleep-related parents of 8% children reported SRBD-OSA. Adenotonsillar hypertrophy and obesity are the important predictors of OSA among children, and most

of the time they are coexistent.^[24] In addition to mimicking ADHD, OSA has been found to have multiple metabolic and cardiovascular complications among children. Studies have reported that OSA among children leads to lipid peroxidation;^[25] increment of proinflammatory markers in body, for example, interleukin 6, interleukin 18, plasminogen activating factor, high-sensitivity-C reactive protein;^[26,27] insulin resistance;^[28] endothelial dysfunction;^[29] and an increase in blood pressure.^[30] However, resolution of OSA by adenotonsillectomy or any other method has been reported to improve all consequences of OSA among children including ADHD and systemic inflammation.^[26,29-31] Considering the high prevalence of OSA in this study among Indian children and multiple adverse consequences which are reversible, there is a need for improving the awareness among pediatricians regarding sleep disorders.

Worsening of growing pains at night was reported by parents of 3.22% subjects with repeated kicking in bed by 2.14%. Earlier studies have suggested a RLS has a prevalence of approximately 2% in Chinese children^[32] and 3% among Turkish children and adolescents;^[33] figures that are close to the prevalence found in this study. However, it should be noted that we did not assess the RLS by face-to-face interview. RLS among children is frequently associated with iron deficiency.^[34] In addition, a number of children in this study had growing pains, and growing pains may be initial presentation of RLS among children.^[35] Considering the impact of RLS on the daytime performance of children, sleep quality at night and considering the prevalence of iron deficiency in India, it would be worthwhile to assess the children for RLS.^[36]

This study had few methodological limitations - first, sample size was small; second, this was a questionnaire-based study, and third, sleep and sleep disorders were not examined using objective measures. However, the strengths of the study lie in the fact that a Hindi translated version of a valid instrument was used that had earlier been found to have good correlation with objective measures.^[12] In future, further studies with improved methodology are required to assess the extent of the problem among children and to analyze the effect of sleep disorder on scholastic performance, behavior, and health.

Table 3: Prevalence of various sleep disorders and their symptoms in children of 4-9 years (n=435)

Disorder/symptom	Prevalence (%)
Sleep related breathing disorder	7.52
Bed-wetting	32.58
Ever snored	11.91
Sweating at night	10.43
Mouth breathing during sleep	9.65
Blocked nose at night	6.59
Parents concerned for child's breathing	2.83
Snorting	1.71
Shake the child to breathe during sleep	1.54
Sleep-related movement disorders	
Growing pains	10.18
Repeated kicking of legs	9.62
Restless legs	5.98
Worsening of growing pain in bed	3.22
Repeated kicking of legs in bed	2.14
Head banging	2.13
Parasomnias	
Sleep talking	22.64
Teeth grinding	13.95
Sleep walking	3.23
Night terrors	7.22
Nightmares	8.48
Hypersomnia	
Irresistible urge to fall asleep during day	12.42
Sleep paralysis	2.45
Cataplexy-like symptoms	2.82
Hypnagogic/hypnopompic hallucinations	2.33

CONCLUSION

This study shows that a significant proportion of children aging between 4 and 9 years suffer from sleep disorders such as SRBD and RLS.

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Conflicts of interest

There are no conflicts of interest.

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