

Sleep quality in children: questionnaires available in Brazil

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ABSTRACT

Introduction: The purpose of this paper was to evaluate and compare the questionnaires regarding sleep quality among children aged up to 12 years old, used in the Portuguese language in Brazil. **Material and methods:** A search at the literature databases of Lilacs, Scielo and Pubmed was performed using keywords “sleep quality” and “children”. Selected Articles were analysed for age of the studied population, the number of questions and the issues addressed thereby, who realized the application, the analysis of the results, and content. **Results:** Out of 9377 titles, 11 studies were included, performing 7 different questionnaires: Questionnaire to measure quality of life among children with enlarged palatine and pharyngeal tonsils (translation of OSD-6) (1); Inventory of Sleep Habits for Preschool Children (2); the Questionnaire on Obstructive Sleep Apnoea-18 (OSA-18) (3), Sleep Questionnaire by Reimão and Lefèvre - QRL (4); the Questionnaire on Sleep Behaviour Patterns (5) and the translation of the Sleep Disturbance Scale for Children (6); Brief Infant Sleep Questionnaire - BISQ (7). Six of the questionnaires have covered the following issues: snoring and daytime sleepiness. **Conclusions:** A total of 7 protocols were found to be available in Brazil, the most commonly mentioned being OSA-18 and OSD-6. The use of protocols as a guided interview helps to define diagnosis and treatment among the paediatric population, but its large variability makes it difficult to compare a standardised monitoring process.

Keywords: Child. Surveys and Questionnaires. Quality of Life. Sleep

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INTRODUCTION

Problems related to sleep patterns are common in early childhood, affecting about one third of the children at school age^{1,2}. These problems are related to several factors as changes in biological, psychological, cultural, social, and family interactions³.

Regarding their prevalence in the general paediatric population, insomnia has been observed in 17% to 41% of children aged between 3 and 14 years old and 38% have parasomnias⁴. Snoring during sleep is estimated to occur in 8% up to 27% of the children⁵. According to DSM-IV⁶, ten to 50% of the children aged between 3 and 5 years old have serious nightmares, while the incidence of night terror ranges from 1 to 6%; one to 5% have somnambulism; up to 20% of the children have at least one episode of sleep disturbances. Obstructive sleep-disordered breathing (SDB) has been reported in 30% of infant population, to be more prevalent in pre-school children, aged 3 to 5 years old, corresponding to the period of higher growth of the pharyngeal and palatine tonsils^{7,8}. Attention should be paid to SDB because it is the sleep disorders that its repercussions are reflected in the medium and long term, as modification in physical and cognitive development, metabolic disorder, cardiovascular alteration, school learning development, behaviour and in life quality, include sleep quality⁹.

The identification of a possible diagnosis of sleep disorders starts with a complete medical anamnesis¹⁰. However, the common paediatric anamnesis does not consider investigation in sleep pattern, mostly in older children; patronized questionnaires on sleep quality and examinations would help to identify the disorders¹¹. Sleep quality is affected by the number of hours slept, the hour of wake-up, the frequency of nocturnal arousals and the presence of sleep disorders, investigation including also the repercussions of these disorders on the daily routine¹². The presence of sleep disorders in children may interfere on behaviour, but also on problems with neuromotor, cognitive, and family development what makes it reasonable to investigate and to identify such disorders as early as possible¹³.

Thus, standard application of patronized protocols will help to diagnose and monitor sleep disorders, as they allow the measurement of the consequences of these disturbances and their effects on the daily and nightly routine, besides the impressions of their parents or care-givers.

PURPOSE

To verify and compare the questionnaires related to sleep quality in children aged 2 to 12 years, translated into the Brazilian Portuguese language.

METHODS

A review of literature was performed, through cross-referencing of the key words "Sleep Quality" AND ("Children" OR "preschool" OR "Child"), "Sleep characteristics" AND ("Children" OR "preschool" OR "Child") and "Sleep Patterns" AND ("Children" OR "preschool" OR "Child"). In order to conduct this review, three essential databases were considered: Lilacs, Pubmed and Scielo.

As inclusion criteria, articles should apply the complete questionnaire including investigation of sleep quality; the questionnaire should be translated and validated for the Brazilian Portuguese language and be of free access. The age group enrolled in the studies should be in the range of 2 to 12 years old, as this age group is more propense for no active investigation of sleep disorders.

In this study, we have considered the term "pre-school" as children aged between 2 to 5 years old, and "child" to the subjects aged between 6 to 12 years old, according to the definition of the MeSH TERMS- Medical Subject.

The literature search was performed by the VPN (Virtual Private Network) system. The selection of the articles was initially made by reading the titles and abstracts. Selected articles were read in full-text for final inclusion. The questionnaires found in the included articles were analysed and compared according to age of the study group; to the number of questions and the issues covered thereby; if the questionnaire was applied directly to the child or to one of the parents; and which methods for analysis of the questionnaires was proposed.

We have attempted to describe their psychometric qualities based in Spruyt and Gozal¹⁴, that described the 11 methodological steps to develop and evaluate a sleep assessment tool. For this we consider 1. Purpose; 2. Research Question; 3. Response Format; 4. Generation of Items; 5. Pilot; 6. Item-analyses and non-response analyses; 7. Structure; 8. Reliability; 9. Validity; 10. Confirmatory analyses; 11. Standardization and norms development.

RESULTS

The search strategy localized 9377 titles in the databases (figure one showing the number of articles for each database, figure 2 showing the number of articles found for each combination of keywords). 11 studies, 9 articles and 2 theses, met the final inclusion criteria, these studies including seven different questionnaires.

The seven different questionnaires were:

1. Questionnaire to measure quality of life among children with enlarged palatine and pharyngeal tonsils (translation of OSD-6)¹⁵⁻¹⁷.

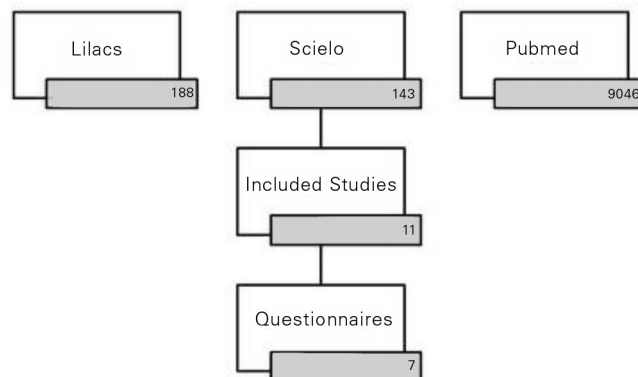


Figure 1. Number of articles for each database

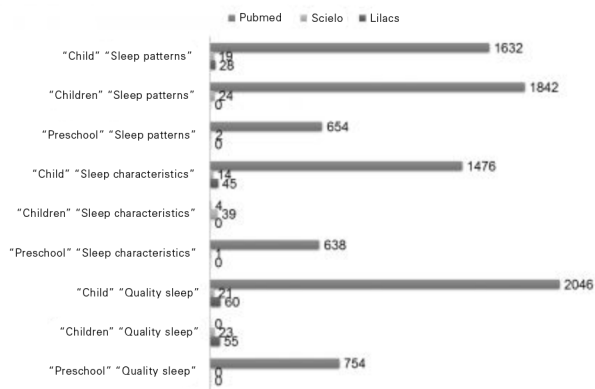


Figure 2. Number of articles found for each combination of keywords.

2. Inventory of Sleep Habits for Preschool Children¹⁸.
 3. Questionnaire on Obstructive Sleep Apnoea-18 (a translated version in Portuguese of Obstructive Sleep Apnoea OSA-18)¹⁹⁻²¹.
 4. Sleep Questionnaire by Reimão and Lefèvre - QRL²².
 5. Questionnaire on Sleep Behaviour Patterns¹⁸.
 6. Translation of the Sleep Disturbance Scale for Children²³.
 7. Brief Infant Sleep Questionnaire - BISQ²⁴.
- Each questionnaire will be discussed separately.

(1) Questionnaire to measure quality of life among children with enlarged palatine and pharyngeal tonsils (translation of OSD-6)

This instrument intends to measure the influence of hypertrophy of the palatine and pharyngeal tonsils on the quality of life and sleep quality among children aged between 2 and 15 years old. The questionnaire is answered by the caregivers. It covers 6 separate domains: "physical suffering", "sleep disorders", "speech and swallowing problems", "emotional discomfort", "limitation of physical activities" and "concern shown by parents or guardians, with regard to the child's snoring". The domains of "physical suffering", "sleep disorders", "speech and swallowing problems", "emotional discomfort" and "concerns shown by parents or guardians regarding the child's snoring" can be quantified as 0 (never), 1 (almost never), 2 (sometimes), 3 (often), 4 (very often) and 5 (could not be worse). The first four items of the domain "limitation of physical activities" are quantified as 0 (always), 1 (almost always), 2 (most of the time), 3 (sometimes), 4 (almost never) and 5 (never), and the last item is quantified as 0 (excellent), 1 (good), 2 (fair), 3 (poor), 4 (very poor) and 5 (terrible). The higher the final score, the worse is considered the child's quality of life. This instrument permits to evaluate the needs and the benefits of adeno- and/or tonsillectomy for young children.

(2) Inventory of Sleep Habits for Preschool Children

The major aim of this questionnaire is to identify changes in the sleep habits of pre-school children, aged 2 to 6 years old. It is answered by the parents or caregivers, regarding about

the child's last week of sleep habits. The questionnaire is composed of 17 questions, considering three different domains: "Bedtime Routines", "Rhythmicity" and "Separation Problems". The answers are classified as 1 (did not occur this week), 2 (occurred once or twice this week), 3 (occurred three to five times this week) and 4 (occurred 6 or more times this week). It is considered a screening instrument for sleep disorders, however, the questionnaire requires knowledge of appropriate and inappropriate sleep habits of the professional, as the scoring system involves qualitative and not quantitative analysis.

(3) Questionnaire on Obstructive Sleep Apnoea-18 (OSA-18)

The purpose of this instrument is to assess the impact of OSA upon the child and the parents or caregivers. This questionnaire contains 18 questions which are divided into five domains: sleep disorders, physical symptoms, emotional symptoms, daily function, and concerns of the parents or caregivers. In the adaptation to Portuguese, the five domains have been translated as: *distúrbios do sono* (sleep disorders), *sintomas físicos* (physical symptoms), *problemas emocionais* (emotional problems), *problemas do quotidiano* (problems of daily routine) and *opinião do informante* (opinion of the informant). Each item is scored on a seven-point ordinal scale, as follows: 1 (never), 2 (almost never), 3 (a few times), 4 (a reasonable number of times), 5 (many times), 6 (almost always) and 7 (always). The questionnaire can be used in children aged 2 to 12 years old, and is answered by the parents or caregivers. The OSA-18 is considered a simple and quick to apply questionnaire, which can be used in clinical contexts and in investigation studies.

(4) Sleep Questionnaire by Reimão and Lefèvre - QRL

With the aim of guiding the diagnosis of sleep disorders and also to characterise the sleep habits and patterns of young children, this instrument is divided into 4 parts: Patient identification data, Appraisal of sleep pattern, Assessment of sleep habits, and Establishment of the presence of sleep disorders. The questionnaire includes the item of description of the purposes; multiple choice questions for some sleep disorders; number of hours slept and the frequencies of occurrence of sleep disorders. The questionnaire is answered by parents or caregivers of children aged between 3 and 5 years old, considering the behaviour of sleep patterns over the last 12 months. It is not possible to obtain a final score, but the questionnaire allows the establishment of quantitative and qualitative indicators.

(5) Questionnaire on Sleep Behaviour Patterns

The purpose of this instrument is to facilitate the investigation of sleep behaviour in the paediatric population aged 7 to 14 years old. It consists of 29 questions addressing sleep behaviour in their children's routine over the previous 6 weeks, answered by the parents. The scale is based on the frequency: 1 (never), 2 (a few times), 3 (a reasonable number of times), 4 (often) and 5 (always). The questions 1, 2, 3 and 25 are scaled differently as: 1 (always), 2 (often), 3 (a reasonable number of

times), 4 (a few times) and 5 (never). The result is related as the higher the score, the worse the quality of sleep and the greater the number of sleep-related problems. This questionnaire allows the quantification of sleep-related problems.

(6) Translation of the Sleep Disturbance Scale for Children

This questionnaire is the most encompassing one with the full version of its translation into Brazilian Portuguese. It accesses a variety of behaviours related to sleep patterns of children and teenagers (ages between 3 and 18 years).

The questionnaire is composed by 26 questions, investigating the behaviour over the last six months, distinguishing between transitory and permanent behaviour. These questions cover several different subjects, divided into six major factors, namely: Factor 1 - Disorders of Initiating and Maintaining Sleep (*Distúrbios de Início e Manutenção de Sono* - DIMS); Factor 2 - Sleep Breathing Disorders (*Distúrbios Respiratórios do Sono* - DRS); Factor 3 - Disorders of Arousal (*Distúrbios do Despertar* - DD); Factor 4 - Sleep-Wake Transition Disorders (*Distúrbios da Transição Sono-Vigília* - DTSV); Factor 5 - Disorders of Excessive Somnolence (*Sonolência Excessiva Diurna* - SED); Factor 6 - Sleep Hyperhidrosis (*Hiperhidrose do Sono* - HS). The answers are reported in a five-point scale as follows: 1 (never), 2 (occasionally), 3 (sometimes), 4 (almost always), 5 (always).

(7) Brief Infant Sleep Questionnaire BISQ

This instrument is used for screening of sleep disorders in infants and toddlers until three years old. It consists of 12 questions about the quality of sleep that should be answered by the parents or caregivers, regarding the sleep period of the last week and takes between 5 and 10 minutes to be applied.

The criteria used to define poor sleep quality based on BISQ measures are: 1) the child wakes up more than 3 times a night; 2) Night watch period greater than 1 hour; Or 3) Total sleep time less than 9 hours. Soothing techniques and the location of sleep are also evaluated, so babies who fall asleep alone in the crib and sleep in a crib in a room separate from their parents are rated with better sleep quality.

The comparison between all questionnaires, regarding their structures is summarized in table 1.

Six questionnaires (1, 2, 3, 4, 5, 6) addressed the following topics: snoring and daytime somnolence. The topics investigated in the different questionnaires are listed as follows: apnoea/choking, hyperactivity and variations of the mood (questionnaires 1, 2, 3 and 6); sleep latency, sleep fragmentation, and restless sleep (questionnaires 2, 3, 4, 5, 6, 7); oral breathing (questionnaire 3); breathing problems (questionnaires 1, 3, 6); emotional discomfort of child and parents (1, 3); limitations on daily activities (questionnaires 1, 4, 5). The questionnaires 2, 4, 5 and 6 investigated parasomnias: sleep-talking; enuresis; bruxism (tooth-grinding); night terror; and sleepwalking. Questionnaire 6 included the presence of hyperhidrosis during sleep, sleep paralysis, Disorders of the Sleep-Wake Transition.

Considering that sleep quality is affected by the number of hours slept, the waking-up hour, the number of arousals, the frequency of sleep disorders, and repercussions on daily routine¹², the included questionnaires were analysed by these items (Table 2).

DISCUSSION

In this review, we found 11 studies reporting seven full questionnaires investigating sleep disorders in the paediatric population, translated into or original in Brazilian Portuguese. Most of the studies were published in specialised periodicals in the area of medicine: 6 articles in the area of otolaryngology, 1 on Epilepsy and Clinical Neurophysiology, and 2 in the area of Sleep Medicine. One of the two theses was in Sleep Medicine and the other in Neurology.

There is a clear need for a systematic screening for sleep problems in the paediatric population in order to identify early academic, cognitive, behavioural, health and quality of life issues, according to Spruyt & Gozal¹⁴. In childhood, the duration and cycle of the different sleep stages differ from those of adults. Thus, it is important to direct studies on sleep quality, health status and individual peculiarities depending on the age of the children²⁵.

In this review, we included questionnaires focusing on children aged 2 to 12 years old. This age group suffers from several sleep disorders, especially those related to respiratory problems, however, paediatricians do not investigate actively and routinely sleep disorders in older children²⁶. Thus, there is a need for specific instruments to recognize sleep complaints in children and to establish early treatment^{1,2,6,8}.

The *Questionnaire about Sleep Behaviour* (Questionnaire 5) has been validated for children, older than 7 years. The protocol with the widest age range is the *Scale for Sleep Disorders in Children* (Questionnaire 6), which includes children between 3 and 18 years old; however, the questionnaire that provides best coverage of the age range as proposed by the study are the *Questionnaire on Obstructive Sleep Apnoea - OSA-18* (Questionnaire 3), (ages 2 to 12) and the *Questionnaire for Assessment of Quality of Life among children with enlarged palatine and pharyngeal tonsils* (Questionnaire 1), (ages 2 to 15). The *Brief Infant Sleep Questionnaire - BISQ* (Questionnaire 7) has a more restricted age range (until 3 years old), followed by *Sleep Questionnaire by Reimão and Lefèvre* (Questionnaire 4) (between 3 and 5 years old), and *Inventory of Sleep Habits for Preschool Children* (Questionnaire 2) (between 2 and 6 years old).

At psychometric evaluation¹⁴, most of questionnaires were based on validated questionnaires in the English language but none of them followed all steps of psychometrics. One of them was translate in different ways¹⁵⁻¹⁷, being very different from the original²⁷. These modifications are not justified by a cautious analysis and cultural adaptation followed by systematic evaluations. Four of them performed the validity (Questionnaires 2, 4, 5, e 6), but some steps were missed as: Systematic confirmation of analyses, Reliability, Response Format, Gen-

Table 1. Comparison of the structures of the questionnaires

Questionnaire	Ages	Number of Questions	Specific Population	Steps fulfilled of psychometric evaluation (Spruyt, Gozal 2011)	References
Questionnaire to measure quality of life among children with enlarged palatine and pharyngeal tonsils	2 to 15	23	Hypertrophy of palatine and pharyngeal tonsils.	1 2 8	BERALDIN et al., 2009; CARNEIRO et al, 2009; Di FRANCESCO et al, 2004
Inventory of Sleep Habits for Preschool Children	2 to 6	29	Preschool children	1 2 5 5 8 9	BATISTA e NUNES,2006
Questionnaire on Obstructive Sleep Apnoea - OSA-18	2 to 12	18	Obstructive Sleep Apnoea	1 2 4 6 7 8	FERNANDES e TELES, 2013; GOMES et al, 2012; LIMA Jr et al, 2008
Sleep Questionnaire by Reimão and Lefèvre	3 to 5	30	Hypothesis of sleep-related problems	1 2 4 5 6 8 9 10	ARAUJO, 2012
Questionnaire on sleep behaviour patterns	7 to 14	29	Asymptomatic population	1 2 5 6 7 8 9	BATISTA e NUNES,2006
Scale of sleep disorders in children	3 to 18	26	Complaints related to sleep, in general	1 2 4 5 6 7 9	FERREIRA et al, 2009; FERREIRA et al, 2009
Brief Infant Sleep Questionnaire - BISQ	0 to 3	12	Asymptomatic population	1 2 3 4 7 8	NUNES et al., 2012

Step 1: Purpose; Step 2: Research Question; Step 3: Response Format; Step 4: Generation of Items; Step 5: Pilot; Step 6: Item-Analysis and non-response analysis; Step 7: Structure; Step 8: Reliability; Step 9: Validity; Step 10: Confirmatory Analyses; Step 11: Standardization and Norms (see Spruyt and Gozal, SMR XXX).

eration of Items, Item-Analysis and non-response analysis and Structure. The most used questionnaire was not validated, just adapted for the Brazilian Portuguese (Questionnaire 3). The questionnaire that fulfilled more steps of psychometrics was the Brazilian questionnaire *Questionário do Sono Infantil de Reimão Lefèvre* (Questionnaire 4), being studied in a doctoral thesis²².

All the questionnaires consist of information obtained by the parents or caregivers, not including items of clinical observation. This might be a limitation on the validity of the instrument, considering that only between 13% and 27% of all parents acknowledge the fact that their children have sleep problems²⁸. It is therefore suggested that the questionnaires should be applied in the form of a guided clinical interview,

Considering the factors which influence sleep quality as proposed by Stein¹², only the *Sleep Questionnaire of Reimão and Lefèvre* (Questionnaire 4) took into account all the factors as: number of hours slept, waking-up time, number of interruptions to sleep, occurrence of sleep disorders, and repercussions of such disorders on daily routine. All other questionnaires lack these information.

The most frequently used protocols were the *Questionnaire for assessment of quality of life among children with enlarged palatine and pharyngeal tonsils* (Questionnaire 1) and the *Questionnaire on Obstructive Sleep Apnoea - OSA-18* (Questionnaire 3) both questionnaires investigating the repercussions of sleep related breathing disorders. The main risk factor for breathing disorder

Table 2. Comparison of the questionnaires regarding the investigation of sleep parameters

Content	Questionnaire						
	1	2	3	4	5	6	7
Number of hours slept				X		X	X
Waking-up hour		X	X	X	X	X	X
Frequency of arousals		X	X	X	X	X	X
Frequency of sleep disorders	X	X	X	X	X	X	
Repercussions on daily routine	X		X	X	X		

ders during sleep in children is the hypertrophy of the tonsils, responsible in up to 75% for obstructive sleep apnoea²⁹. Three questionnaires have specific content addressing breathing problems, namely the *Questionnaire for assessment of quality of life among children with enlarged palatine and pharyngeal tonsils* (Questionnaire 1), the *Questionnaire on Obstructive Sleep Apnoea - OSA-18* (Questionnaire 3) and the *Scale of sleep disorders in children* (Questionnaire 6), the first questionnaire being specific for the population with enlarged tonsils. The *Questionnaire OSA 18* (Questionnaire 1), investigates the likelihood of a child having OSA and its repercussions on quality of life and daily activities. Its validation is therefore very important for the paediatric population, as the physiopathology, the clinical picture, and treatment of OSA in children are different from the adult form³⁰.

The *Questionnaire for assessment of quality of life among children with enlarged palatine and pharyngeal tonsils* (Questionnaire 1), the *Inventory of Sleep Habits for Preschool Children* (Questionnaire 2), the *Questionnaire on Obstructive Sleep Apnoea - OSA-18* (Questionnaire 3) and the *Scale of sleep disorders in children* (Questionnaire 6) are all questionnaires which have been translated into Brazilian Portuguese, thus allowing a comparison to the paediatric population in other countries. Besides the translation, all have also been through a validation process, which guarantees the use of the questionnaire³¹.

Even though there are several specific questionnaires for the investigation of some of the most common sleep disorders in children, as *The Questionnaire for assessment of quality of life among children with enlarged palatine and pharyngeal tonsils* (Questionnaire 1), the *Questionnaire on Obstructive Sleep Apnoea - OSA-18* (Questionnaire 3) and the *Scale of sleep disorders in children* (Questionnaire 6), there is no patronized questionnaire, considering the whole range of sleep disorders among children. The lack of a common and widely used screening questionnaire impairs the early recognition and treatment of sleep disorders.

All questionnaires found in this review also showed a great variability of questions and of the analysis of their results, thus being limited for comparison inter-study of the obtained data. This diversity of screening instruments and their interpretations difficults an analysis of prevalence and severity of the different sleep disorders in Brazil.

CONCLUSIONS

In this review, there was found a restricted number of questionnaires for the investigation of sleep disorders in children aged 2 to 12 years old, most of them being limited to the investigation of breathing disorders during sleep, as the most

cited were OSA-18 and OSD. The variability of different applications and interpretations of these questionnaires makes it difficult to standardise a screening instrument and to establish prevalence, diagnosis and follow-up of sleep disorders in the paediatric population.

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