International Journal of Contemporary Pediatrics
Galgali MU et al. Int J Contemp Pediatr. 2025 Feb;12(2):240-245
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20250091

Original Research Article

Profile of sleep problems and its relation to sleeping habits in toddlers

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Received: 18 November 2024
Revised: 11 December 2024
Accepted: 02 January 2025

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ABSTRACT

Background: Sleep is essential for the neurological development, cognition and behavior of children. Sleep problems affect 15-40% of children globally, with a prevalence of 47.5% in India. This study aimed to determine the prevalence and profile of sleep problems in toddlers aged 1-3 years.
Methods: A 24-month cross-sectional study was conducted in rural Bangalore with 1,255 children aged 1-3 years visiting the outpatient department. Sleep problems were assessed using the Children's Sleep Habits Questionnaire (CSHQ). A Total Sleep Disturbance score of 41 or higher, based on responses to all 33 items across the eight subscales, suggests the presence of a sleep disturbance.
Results: Of the children, 48.3% experienced sleep problems, with a higher prevalence in children aged 1-2 years (32.7%) compared to 2-3 years (67.3%). Most children (54.7%) were male. The most common bedtime was 9:00 pm. Average sleep durations were: 9.41±1.55 hours at night, 2.30±0.79 hours during the day and 11.80±1.43 hours total sleep. Most children woke up twice during the night (28%). The mean CSHQ score was 40.55±4.24. Factors such as age, bedtime and number of awakenings were linked to sleep problems. The lowest prevalence was found in those sleeping at 8:30 pm (18.2%). Sleep problems were more common in children with 4 nighttime awakenings (75%).
Conclusions: Sleep disorders are common in toddlers, highlighting the need for pediatricians to identify and address sleep problems early.

Keywords: CSHQ, Sleep problems, Sleep patterns, Sleep habits, Sleep disturbance

INTRODUCTION

Sleep plays a critical role in the neurological development, cognition and behavior of children. About 15%–40% of children in different parts of the world are reported to have sleep problems. In a school-based study in India, the prevalence of sleep disorders was found to be 47.5%, with 12.7% having snoring and 4.8% having features of sleep-disordered breathing (SDB).[1]

Similarly, in a hospital-based study on children in India, the prevalence was found to be 42.7%, with 5.8% reporting the presence of snoring.[1] Younger children often struggle with bedtime resistance and nocturnal awakenings, while older children commonly face difficulties falling asleep and daytime fatigue. Most studies have focused on students' sleep habits and neglected to examine sleep patterns of children younger than 4 years, which could have serious consequences for future physical and mental health. Sleep is one of the most discussed topics during child wellness visits. It is important for pediatricians to be familiar with normal childhood sleep patterns and common sleep disorders. Distinguishing significant sleep disruptions from normal age-related changes can be challenging and can ultimately delay treatment.

METHODS

Study type

This was a cross-sectional descriptive study.

Study place

The study was conducted at MVJ Medical College and Hospital in rural Bangalore with 1,255 children.

Study duration

The study period was from between May 2022 to May 2024.

Inclusion criteria

This study included healthy children and their siblings, aged 1-3 years, who attended the pediatric outpatient department.

Exclusion criteria

Children with chronic illnesses, neurological or behavioral disorders and those on chronic medications that could affect sleep were excluded from the study.

Mothers of eligible toddlers who met the inclusion and exclusion criteria were interviewed using the validated Children's Sleep Habits Questionnaire (CSHQ). Data was recorded on a pre-designed form, along with basic demographic information. The CSHQ assesses sleep habits and identifies sleep problems across eight key areas: bedtime resistance, sleep onset delay, sleep adequacy, sleep anxiety, nighttime awakenings, parasomnia (e.g., sleepwalking, nightmares), respiratory issues during sleep and daytime sleepiness. Informed Consent was obtained from parents prior to inclusion and Institutional ethical clearance was obtained prior to the start of the study.

The questionnaire uses a scoring system based on frequency: 1 point for "rarely," 2 points for "sometimes," and 3 points for "often." A total score of 41 or higher suggests the presence of a sleep disturbance, which is derived from responses to all 33 items across the subscales.

Statistical analysis

Data was entered into an Excel sheet and analyzed using SPSS version 22. Descriptive statistics presented categorical data as frequencies and proportions, while chi-square tests were used to assess the significance of qualitative data. Continuous data were summarized as means and standard deviations and normality was checked using the Kolmogorov–Smirnov and Shapiro–Wilk tests.

Independent t-tests were applied to identify mean differences between two quantitative variables and the Mann-Whitney U test was used for non-parametric data. Graphical representations, including bar and pie charts, were created using MS Excel and Word. A p value of less than 0.05 was considered statistically significant.

RESULTS

Our study included 1,255 children aged 1 to 3 years, with the majority (67.3%) aged between 2 and 3 years and a slightly higher proportion of males (54.7%). Of the 1,255 children, 649 (51.7%) had a CSHQ score below 41, indicating no significant sleep problems, while 606 children (48.3%) had a score of 41 or higher, suggesting the presence of sleep-related issues.

Bedtime distribution revealed that the most common bedtimes were 9:00 pm (20.9%) and 11:00 pm (18.0%), with fewer children going to bed at earlier times (e.g., 7:00 pm) or later times beyond 11:30 pm. Older children (aged 2-3 years) were more likely to have later bedtimes compared to younger children (aged 1-2 years). The average duration of nighttime sleep was 9.41±1.55 hours, while the average daytime sleep duration was 2.30 hours. The total average sleep duration across a 24-hour period was 11.80±1.43 hours. Sleep durations were relatively consistent, with nighttime sleep slightly exceeding the median and daytime sleep falling just below it.

Regarding nighttime awakenings, most children experienced between 0 and 2 awakenings. Specifically, 17.2% of children had no nighttime awakenings, 26.7% had one, 28.0% had two and 24.0% had three. A smaller proportion (4.1%) had four awakenings per night.

Children in the 1-2 years age group averaged three awakenings per night, while those in the 2-3 years age group averaged two. Notably, all children in the study slept in the same room as their parents. Children with higher CSHQ scores demonstrated difficulties in multiple areas, including resistance to going to bed, sleep onset delay, sleep adequacy, sleep anxiety, nighttime awakenings, parasomnias and sleep-related respiratory problems.

Associations with sleep problems

Chi-square tests revealed significant associations between several factors and the presence of sleep problems.

Age

Younger children (aged 1-2 years) had a significantly higher rate of sleep problems compared to children aged 2-3 years ($p<0.001$).

Gender

There was no significant difference in sleep problems between males and females.

Bedtime

A strong correlation was observed between bedtime and sleep problems. Later bedtimes were associated with a higher likelihood of sleep problems in children.

Number of awakenings

Frequent awakenings were linked to a higher likelihood of sleep problems.

Sleeping arrangements

All children in the study co-slept with their parents, limiting the ability to examine the impact of different sleeping arrangements.

Mann-Whitney U test

Children with sleep problems demonstrated higher mean scores across several categories, indicating greater difficulty in various aspects of sleep.

Resistance to going to bed

Children with sleep problems had a significantly higher mean score (7.02) compared to those without sleep problems (6.49), with a significant difference ($p<0.001$). This suggests that bedtime resistance is more prevalent among children with sleep problems.

Sleep delay

The mean score for sleep delay was higher in children with sleep problems (2.09) than in those without (1.79), with a significant difference ($p<0.001$), indicating that children with sleep problems experience more difficulty falling asleep.

Sleep adequacy

Children with sleep problems had a significantly higher mean score (7.21) than those without sleep problems (5.66), with a p value of <0.001. This suggests that children with sleep problems are more likely to experience inadequate sleep.

Sleep anxiety

The mean score for sleep anxiety was higher in children with sleep problems (3.35) than in those without (3.19), with a significant p-value of 0.008. This indicates that children with sleep problems are more likely to experience sleep-related anxiety.

Nighttime awakenings

Children with sleep problems had a slightly higher mean score for nighttime awakenings (3.27) compared to those without sleep problems (3.20), with a p-value of 0.037, suggesting that children with sleep problems are more likely to experience nocturnal awakenings.

Parasomnias

The mean score for parasomnias (e.g., sleepwalking, night terrors) was significantly higher in children with sleep problems (10.23) compared to those without (8.32), with a p-value of<0.001, indicating a higher prevalence of parasomnias in children with sleep problems.

Respiratory problems during sleep

Children with sleep problems had a higher mean score for respiratory issues during sleep (5.32) compared to those without sleep problems (3.84), with a statistically significant difference ($p<0.001$), suggesting that sleep-related respiratory problems are more common in children with sleep problems.

Daytime sleepiness

While the mean score for daytime sleepiness was slightly higher in children with sleep problems (8.38) than in those without (8.32), this difference was not statistically significant ($p=0.084$), indicating that daytime sleepiness is not strongly associated with sleep problems in this sample.

Table 1: Factors associated with sleep problems.

		CSHQ score				P value
		<41 (no sleep problem)		>41 (sleep problems present)		
		Count	Row %	Count	Row %	
Age (in years)	1 to 2	99	24.1	312	75.9	<0.001*
	2 to 3	550	65.2	294	34.8	
Gender	Female	289	50.9	279	49.1	0.591
	Male	360	52.4	327	47.6	
Average bed time	7:00 pm	0	0.0	14	100.0	<0.001*
	8:00 pm	70	34.8	131	65.2	
	8:30 pm	81	81.8	18	18.2	
	9:00 pm	164	62.6	98	37.4	
	9:30 pm	10	11.2	79	88.8	
	10:00 pm	73	41.0	105	59.0	
	10:30 pm	97	65.5	51	34.5	
	11:00 pm	132	58.4	94	41.6	

Continued.

		CSHQ score				P value
		<41 (no sleep problem)		>41 (sleep problems present)		
		Count	Row %	Count	Row %	
	11:30 pm	18	54.5	15	45.5	
	12:00 am	4	80.0	1	20.0	
Number of awakenings	0	138	63.9	78	36.1	<0.001*
	1	193	57.6	142	42.4	
	2	176	50.1	175	49.9	
	3	129	42.9	172	57.1	
	4	13	25.0	39	75.0	
Does the child sleep in a crib in a separate room / with parents / with siblings	With parents	649	51.7	606	48.3	-

*significant value

Table 2: Comparison of CSHQ parameters with Sleep problems.

	CSHQ score classification										P value
	<41					>41					
	Mean	SD	Median	95% Confidence interval		Mean	SD	Median	95% Confidence interval		
				Lower bound	Upper bound				Lower bound	Upper bound	
Child's resistance to going to bed	6.49	0.88	7	6.43	6.56	7.02	1.25	7	6.92	7.12	<0.001*
Sleep delay	1.79	0.70	2	1.74	1.85	2.09	0.80	2	2.03	2.16	<0.001*
Sleep adequacy	5.66	1.51	5	5.55	5.78	7.21	0.93	7	7.13	7.28	<0.001*
Sleep anxiety	3.19	1.17	3	3.10	3.28	3.35	0.90	4	3.28	3.42	0.008*
Waking up at night	3.20	0.51	3	3.16	3.24	3.27	0.68	3	3.22	3.33	0.037*
Parasomnia	8.32	1.35	8	8.21	8.42	10.23	2.21	10	10.06	10.41	<0.001*
Respiratory problems while sleeping	3.84	0.89	4	3.77	3.91	5.32	1.26	5	5.22	5.42	<0.001*
Daytime sleepiness	8.32	0.68	8	8.26	8.37	8.38	0.69	8	8.33	8.44	0.084

*significant value

DISCUSSION

Prevalence of sleep problems

In our study, 48.3% of children experienced significant sleep problems according to the Child Sleep Habits Questionnaire (CSHQ), with no significant gender differences observed. In contrast, Sima Maree's study 2 found that approximately 70.8% of children reported sleep problems, with boys being more affected than girls.

Similarly, Kelly's study 3 reported a 35% prevalence of sleep difficulties, with boys again experiencing more issues than girls. The discrepancies in the reported prevalence rates may be attributed to several factors, including demographic differences, parental reporting biases or variations in the specific populations studied.

Sleep patterns and bedtimes

Bedtimes

In our study, the most common bedtime was 9:00 p.m. (20.9%). Among children aged 1-2 years, 36.3% went to sleep before 9:00 p.m., while 19.5% of children aged 2-3 years did the same. Overall, about 75% of our study

population went to bed after 9:00 p.m., showing a trend towards later bedtimes like other studies done in the eastern parts of the world.

Sima Maree's study 2 found that over 60% of children went to bed after 11:00 p.m. Bharath Reddy's study also showed a trend of later bedtimes, with an average bedtime of 9:45 p.m. In contrast, in the study by Christiane et al, the mean bedtime was reported to be 7:54 p.m.[4] A study by Mindell 5 reported Indian children having bedtime as late as 10.30 pm. Children in the west have been observed to have earlier bedtime than those in the east ranging from 7.43 pm in Australia and New Zealand to 8.27 pm in U.S.[5,6] This could be due to the cultural practices and other factors in the west.

Nighttime sleep

The average night sleep duration in our study was 9.41±1.55 hours. Nighttime sleep was slightly longer in case of older children where 1-2 years reported 9.31 hours and 2-3 years old reported 9.46 hours. Bharath Reddy's study. 1 (1-18m of age) also revealed similar results with an average of 8.58 hours. In a similar study by Barathy C et al, the mean night sleep duration was 9.24±1.23 hours among toddlers (1-3years).[7]

Day time sleep

Children aged 1 to 2 years had an average daytime sleep duration of 2.42 hours and children aged 2 to 3 years have an average daytime sleep duration of 2.25 hours in our study which is in normal range of daytime sleep (1-3 hours).[3] The study by Barathy C et al, revealed similar findings with mean day time sleep duration of 2.14±1.15 hours among toddlers (1-3years).[7] In the study by Sima Maree et al, the mean day time sleep duration was reported to be 1.75 ± 0.97 hours.[2]

Total sleep duration

Our study reported an average night sleep duration of 9.41 hours, with daytime sleep averaging 2.30 hours, resulting in a total average sleep of 11.80 hours which is in the normal range of 11-14 hours.[3] In the study by Barathy C et al, the mean total sleep duration was 11.58±1.81 hours among toddlers (1-3years).[7] Similar findings were reported in the study by Sima Maree, where average nighttime sleep was around 11 hours.[2]

Co-sleeping

In our study all children slept with their parents, while in the study by Sima Maree et al, 87% of the children slept with their parents.[2] Co-sleeping was seen in 97.5 % of all children in the study by Barathy C et al, which is slightly higher than that reported by Bharti (93%) and Rozario (84%).[7-9] The findings are consistent with other studies i.e. most of the children slept with their parents' bed. Kelly C.

Bayers' 3 data indicate most children (62.5%-81.9%) slept in their own bed, a notable percentage of infants (16.6%) and toddlers (17.2%) co-slept with parents. In the west even among infants and toddlers co-sleeping prevalence ranged from 5-36%.[10,11] Higher prevalence of co-sleeping in the east could be due to socio-cultural factors where it is believed that children feel well loved and secure and secondly due to economic factors.

Number of night awakenings

Most children in our study experienced 0 to 2 awakenings during the night, with 17.2% having no awakenings, 26.7% having one, 28.0% having two and 24.0% having three. A smaller proportion, 4.1%, have four awakenings. Children aged 1 to 2 years average 3 awakenings per night, while those aged 2 to 3 years average 2 awakenings. 71.8% (902 out of 1255) participants had normal frequency of nocturnal awakenings. In Sima Maree's study, 11% of children do not wake up at night and 16% always wake up at night. In the study by Bharath Reddy et al, the mean of 3.32(±1.57) was noted for awakenings during night sleep in the study population (1-18 months) with no significant difference across age-groups. Study by Sun W et and Mohammadi M et al, 13.86%-32.46% of study samples (2-6 years) had nocturnal awakenings.[12,13] The evolution of reducing night-time awakenings is from birth to 3 years old and there is no difference between Asian and non-Asian children.[2]

Sleep problems and CSHQ scores

Out of the total group, 649 children (51.7%) have a score of less than 41, indicating no sleep problems. On the other hand, 606 children (48.3%) have a score of 41 or higher, suggesting they have sleep problems. Our study reported a mean CSHQ score of 40.55. The Child sleep habit Questionnaire (CSHQ) scores in our study showed following sleep problems like moderate resistance to going to bed, sleep inadequacy and daytime sleepiness, with concerns regarding parasomnias. In comparison, Sima Maree's study found a mean CSHQ score of 39.8, with sleep difficulties, especially in areas like bedtime resistance and sleep anxiety.[2] Christiane's study documented a mean score of 37.5, with significant issues with respect to sleep anxiety and sleep onset latency.[4] Kelly's study reported a higher mean CSHQ score of 41.2, with notable concerns related to night wakings and parasomnia. Mean CSHQ score is like other studies.[3]

The correlation between different subscales of the Children's Sleep Habits Questionnaire (CSHQ) reveals that children who resist going to bed are more likely to experience delays in falling asleep and have more frequent night awakenings. Resistance to sleep is also linked to parasomnias, indicating that difficulties in going to bed may relate to disruptive sleep behaviors like nightmares. Resistance to sleep is less common when

children have a consistent sleeping place, highlighting the importance of a stable sleep environment.

Frequent night awakenings are associated with shorter overall sleep duration, indicating that disturbances during the night reduce total sleep. Sleep duration is also reduced in children with respiratory problems like snoring, suggesting that breathing issues can significantly disrupt overall sleep quality. Children with higher levels of sleep anxiety tend to wake up more frequently at night and may wake up later in the morning due to disrupted sleep patterns. Night awakenings are related to increased daytime sleepiness, suggesting that disrupted sleep at night affects overall alertness and functioning during the day.

Socioeconomic and cultural factors

Most of the children in our study were from low socioeconomic status (SES) and a significant number had sleep problems and poor sleep patterns. Other studies found that children from lower-income families exhibited more sleep issues, with cultural factors impacting sleep routines and practices.[2,4] Since this is a hospital-based study, the potential for selection bias may lead to an overestimation of the prevalence of sleep problems, which limits the generalizability of the findings. Additionally, parents visiting the hospital may be more anxious about their children's health, which could influence how they respond to the questionnaire, resulting in recall bias. The findings are specific to children aged 1-3 years and may not apply to other age groups.

CONCLUSION

This study revealed a high prevalence of sleep problems among toddlers aged 1 to 3 years, with approximately 48.3% of participants affected. Key factors influencing sleep issues included age, average bedtime, duration of night sleep, total sleep duration and frequency of awakenings. The total sleep duration in our study was within a typical range, indicating a balanced sleep pattern among the study population. As children grow, they tend to sleep a bit longer at night and have shorter naps during the day. The number of awakenings decreases as they get older. Children with higher CSHQ scores indicate the presence of sleep problems in areas like resistance to going to bed, sleep delay, sleep inadequacy, sleep anxiety, waking up at night, parasomnias and respiratory problems during sleep. With better training in sleep medicine and understanding how young children sleep, healthcare providers can help families create healthier sleep habits for their toddlers.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Galgali MU, Premalatha R. Profile of sleep problems and its relation to sleeping habits in toddlers. Int J Contemp Pediatr 2025;12:240-5.