

## A Cross-Sectional Study of Sleep Habits among Adolescents between 11 and 18 years using Modified Children's Sleep Habits Questionnaire.

Karthik Kanangi<sup>1</sup>, Sudha Reddy V R<sup>2</sup>, Karthik S<sup>3\*</sup>

- <sup>1.</sup> Final year Postgraduate, Sri Devaraj Urs Medical College, Tamaka, Kolar-563101.
- <sup>2.</sup> Sudha Reddy V R, Professor and Head, Department of Paediatrics, Sri Devaraj Urs Medical College, Tamaka, Kolar-563101.
- <sup>3.</sup> Karthik S: Assistant Professor Department of Paediatrics, Sri Devaraj Urs Medical College, Tamaka, Kolar-563101.

\* Corresponding Author- Karthik S  
Email ID : [-Sk.karthik.1508@gmail.com](mailto:-Sk.karthik.1508@gmail.com)

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### ABSTRACT

**INTRODUCTION:** Sleep being an important part of life helps in physical, behavioral and emotional development apart from determining cognitive learning, functioning, and attention. Despite the magnitude and clinical importance of sleep issues, there is a low level of recognition of sleep disorders by primary care physicians among adolescents. The current study aims to find the sleep pattern among adolescents aged between 11 and 18 years using Modified Children's Sleep Habits Questionnaire.

**MATERIALS AND METHODS:** This cross-sectional observational study was conducted for 3 months among adolescents aged between 11 and 18 years visiting our tertiary care hospital. Adolescents diagnosed with neurological problems and on medications affecting sleep were excluded from the study. After obtaining informed assent, a pre-designed, pre-validated questionnaire (Modified Children's Sleep Habit Questionnaire, CSHQ) was distributed to the adolescents visiting the hospital. Data was entered into a Microsoft Excel data sheet and was analyzed.

### RESULTS

There were 48.1% females and 51.9% males in our study. Among study participants, 42.3% belonging to the age group 14-18 years had trouble sleeping, while only 7.7% belonging to the age group 11-13 had trouble sleeping. Sleeping alone in bed, fighting with parents to go to bed, and feeling hard to go to bed, were seen more in the 14-18 year age group compared to the 11-13 year age group. Falling asleep in other's bed, ready to sleep at the usual time, sleeping too little, and waking up at night while parents think that they are sleeping was seen more among the children in the age group 11-13 years.

### Conclusion

Our research identified varying sleep behaviors among participants. Older children exhibited more issues such as trouble sleeping, sleeping alone, resisting bedtime and difficulty falling asleep. Conversely, younger children were more prone to insufficient sleep and waking up at night while their parents believed they were asleep.

### INTRODUCTION

Sleep being an important part of life helps in physical, behavioral and emotional development apart from determining cognitive learning, functioning, and attention.<sup>1</sup> It is also seen to strengthen the immune system, fight inflammation, help in memory retention, and keep cell adhesion in check so that the heart and blood vessels are protected.<sup>2</sup> Infants spend nearly half of their day in sleep which gradually shortens with the growing age. It can be affected not only by biological factors but also by cultural, social, economic and environmental factors. This is supported by the fact that different countries have shown different sleep patterns in children. For example, Asian countries have shown sleep duration one hour shorter (going to bed 32 minutes late and waking up 32 minutes earlier) compared to their American counterparts while 5% of the Australian children have shown < 3 hours of sleep per day.<sup>3</sup> Factors that affect sleep may include pre-sleep behavior like, watching TV or spending time on screens, lifestyle choices such as the use of caffeine products, or the burden of schoolwork.<sup>4</sup> It has been found that children who have longer screen time, show difficulty in both sleeping as well as in waking up.<sup>5</sup> Both suboptimal sleep duration and sleep disturbance in turn are associated with reduced academic functioning, including attention difficulties and increased absences.<sup>6</sup> Children Sleep Disorder (CSD) is one of the most common disorders in children around the world and in recent years, its incidence has shown a significant increasing trend. Studies indicate a prevalence of CSD in children to be 10 –75%, which may be in the form of simple bedtime resistance, parasomnias, frequent sleep-waking, and obstructive sleep apnea.<sup>3</sup>

Despite the magnitude and clinical importance of sleep issues, there is a low level of recognition of sleep disorders by primary care physicians among adolescents.<sup>7</sup> The current study aims to find the sleep pattern among adolescents aged between 11 and 18 years using Modified Children's Sleep Habits Questionnaire.<sup>8</sup>

## **MATERIALS AND METHODS**

This Cross-Sectional Observational Study was conducted for a period of 3 months (December 2023 – February 2024) among adolescents aged between 11 and 18 years visiting tertiary care hospital. Adolescents diagnosed with neurological problems and on medications affecting sleep were excluded from the study. Informed assent from the adolescent and informed consent from parent was taken. A pre-designed, pre-validated questionnaire (Modified Children's Sleep Habit Questionnaire), CSHQ was distributed to the adolescents visiting the hospital. Any doubts by the children and parents were clarified. The CSHQ is a 26-item survey for parents, which is designed to assess the sleep domains of their children. In the present study, this questionnaire was modified to collect the responses from the adolescents if there able to comprehend and respond, or from parents for younger age groups. The socioeconomic status was noted according to the Modified Kuppuswamy's Socioeconomic scale and assigned into upper, upper middle, lower middle, upper lower, or lower class. The questions were grouped into six blocks, with each addressing an aspect of sleep quality/quantity, and were answered based on a 3-point scale. The points system designates "usually" (5–7 times/week) 3 points, "sometimes" (2–4 times/week) 2 points, and "rarely" (0-1 times/week) 1 point; a higher score indicates more abnormal sleep. Data was entered into a Microsoft Excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. P value (Probability that the result is true) of <0.05 was considered statistically significant after assuming all the rules of statistical tests.

## **RESULTS**

**Table 1: Basic details of the study participants**

<b>Study variables</b>	<b>Frequency (%)</b>
<b>Age group</b>	
11 -13 years	26(50%)
14-18 years	26(50%)
Mean ± SD	13.5 ± 1.94
<b>Gender</b>	
Female	25(48.1%)
Male	27(51.9%)
<b>Socio economic status</b>	
Upper middle	9(17.3%)
Lower middle	33(63.5%)
Upper lower	8(15.4%)
Lower	2(3.8%)

Table 1 shows the demographic data of the study participants. There were equal number of participants in the age group 11-13 years and 14-18 years. There were 48.1% females and 51.9% males in our study. When the socioeconomic status of the study participants was seen, more than half of the study participants (63.5%) belonged to lower middle class, followed by 17.3% in upper middle class, 15.4% in upper lower class and 3.8% in lower class.

**Table 2: Frequency of Responses to the Children’s Sleep Habits Questionnaire from children aged 11 -13 years.**

<b>Question No.</b>	<b>Questions</b>	<b>Frequency (%)</b>		
		<b>Usually (3 points)</b>	<b>Sometimes (2 points)</b>	<b>Rarely (1 point)</b>
<b>Q1</b>	Trouble sleeping	0 (0.0%)	2 (7.7%)	24 (92.3%)
<b>Q2</b>	Likes to sleep	16 (61.5%)	10 (38.5%)	0 (0.0%)

<b>Block 1: bedtime resistance</b>				
Q3	Goes to bed at same time	22 (84.6%)	4 (15.4%)	0 (0.0%)
Q4	Falls asleep in same bed	18 (69.2%)	5 (19.2%)	3 (11.5%)
Q5	Sleeps alone	4 (15.4%)	9 (34.6%)	13 (50.0%)
Q6	Falls asleep in other's bed	6 (23.1%)	9 (34.6%)	11 (42.3%)
Q7	Fights with parents to go to bed	0 (0.0%)	4 (15.4%)	22 (84.6%)
Q8	Hard to go to bed	0 (0.0%)	4 (15.4%)	22 (84.6%)
Q9	Ready to sleep at usual bedtime	11 (42.3%)	2 (7.7%)	13 (50.0%)
Q10	Stay up late when parents think you are asleep	0 (0.0%)	2 (7.7%)	24 (92.3%)
<b>Block 2: sleep onset delay</b>				
Q11	Falls asleep in 20 minutes	5 (19.2%)	10 (38.5%)	11 (42.3%)
<b>Block 3: sleep anxiety</b>				
Q12	Takes a special thing to bed	4 (15.4%)	8 (30.8%)	14 (53.8%)
Q13	Afraid of dark	3 (11.5%)	11 (42.3%)	12 (46.2%)
Q14	Afraid of sleeping alone	8 (30.8%)	12 (46.2%)	6 (23.1%)
Q15	Awake during the night and are sweating or screaming	0 (0.0%)	6 (23.1%)	20 (76.9%)
<b>Block 4: sleep duration</b>				
Q16	Sleeps too little	1 (3.8%)	3 (11.5%)	22 (84.6%)
Q17	Sleeps too much	2 (7.7%)	11 (42.3%)	13 (50.0%)
<b>Block 5: night awakening</b>				
Q18	Wakes up at night when parents think you are asleep	3 (11.5%)	10 (38.5%)	13 (50.0%)
Q19	Trouble falling back asleep after waking up	0 (0.0%)	7 (26.9%)	19 (73.1%)
Q20	Have nightmares	0 (0.0%)	11 (42.3%)	15 (57.7%)
Q21	Wakes up due to pain	0 (0.0%)	2 (7.7%)	24 (92.3%)
Q22	Goes to other's bed during night	0 (0.0%)	3 (11.5%)	23 (88.5%)
<b>Block 6: daytime sleepiness</b>				
Q23	Trouble waking up in morning	0 (0.0%)	7 (26.9%)	19 (73.1%)
Q24	Feels sleepy during day	0 (0.0%)	18 (69.2%)	8 (30.8%)
Q25	Takes naps during day	1 (3.8%)	19 (73.1%)	6 (23.1%)

<b>Q26</b>	Feels rested after a night's sleep	0 (0.0%)	2 (7.7%)	24 (92.3%)
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**Table 3: Frequency of Responses to the Children's Sleep Habits Questionnaire from children aged 14 -18 years.**

Question No.	Questions	Frequency (%)		
		Usually (3 points)	Sometimes (2 points)	Rarely (1 point)
<b>Q1</b>	Trouble sleeping	3 (11.5%)	8 (30.8%)	15 (57.7%)
<b>Q2</b>	Likes to sleep	15 (57.7%)	6 (23.1%)	5 (19.2%)
<b>Block 1: bedtime resistance</b>				
<b>Q3</b>	Goes to bed at same time	16 (61.5%)	8 (30.8%)	2 (7.7%)
<b>Q4</b>	Falls asleep in same bed	22 (84.6%)	2 (7.7%)	2 (7.7%)
<b>Q5</b>	Sleeps alone	20 (76.9%)	4 (15.4%)	2 (7.7%)
<b>Q6</b>	Falls asleep in other's bed	0 (0.0%)	5 (19.2%)	21 (80.8%)
<b>Q7</b>	Fights with parents to go to bed	4 (15.4%)	9 (34.6%)	13 (50.0%)
<b>Q8</b>	Hard to go to bed	1 (3.8%)	8 (30.8%)	17 (65.4%)
<b>Q9</b>	Ready to sleep at usual bedtime	18 (69.2%)	6 (23.1%)	2 (7.7%)
<b>Q10</b>	Stay up late when parents think you are asleep	4 (15.4%)	6 (23.1%)	16 (61.5%)
<b>Block 2: sleep onset delay</b>				
<b>Q11</b>	Falls asleep in 20 minutes	13 (50.0%)	10 (38.5%)	3 (11.5%)
<b>Block 3: sleep anxiety</b>				
<b>Q12</b>	Takes a special thing to bed	0 (0.0%)	0 (0.0%)	26 (100.0%)
<b>Q13</b>	Afraid of dark	0 (0.0%)	5 (19.2%)	21 (80.8%)
<b>Q14</b>	Afraid of sleeping alone	0 (0.0%)	4 (15.4%)	22 (84.6%)
<b>Q15</b>	Awake during the night and are sweating or screaming	0 (0.0%)	7 (26.9%)	19 (73.1%)
<b>Block 4: sleep duration</b>				
<b>Q16</b>	Sleeps too little	2 (7.7%)	13 (50.0%)	11 (42.3%)
<b>Q17</b>	Sleeps too much	1 (3.8%)	10 (38.5%)	15 (57.7%)
<b>Block 5: night awakening</b>				

<b>Q18</b>	Wakes up at night when parents think you are asleep	1 (3.8%)	3 (11.5%)	22 (84.6%)
<b>Q19</b>	Trouble falling back asleep after waking up	0 (0.0%)	6 (23.1%)	20 (76.9%)
<b>Q20</b>	Have nightmares	0 (0.0%)	6 (23.1%)	20 (76.9%)
<b>Q21</b>	Wakes up due to pain	1 (3.8%)	0 (0.0%)	25 (96.2%)
<b>Q22</b>	Goes to other's bed during night	0 (0.0%)	0 (0.0%)	26 (100.0%)
<b>Block 6: daytime sleepiness</b>				
<b>Q23</b>	Trouble waking up in morning	0 (0.0%)	12 (46.2%)	14 (53.8%)
<b>Q24</b>	Feels sleepy during day	1 (3.8%)	19 (73.1%)	6 (23.1%)
<b>Q25</b>	Takes naps during day	1 (3.8%)	17 (65.4%)	8 (30.8%)
<b>Q26</b>	Feels rested after a night's sleep	0 (0.0%)	10 (38.5%)	16 (61.5%)

Tables 2 and 3 depict the frequency of response of the study participants according to the different blocks of the Modified Children's Sleep Habit Questionnaire

**Table 4: Comparisons of sleep habits and age group (11-13 years and 14-18 years) of children.**

Questions		Test statistic	P value
Block 1: bedtime resistance	Q1. Trouble sleeping	8.307	0.003
	Q5. Sleeps alone	20.656	0.001
	Q6. Falls asleep in other's bed	8.125	0.0043
	Q7. Fights with parents to go to bed	7.07	0.0077
	Q9. Ready to sleep at usual bedtime	11.756	0.003
	Q10. Stay up late when parents think you are asleep	6.93	0.008
Block 2: sleep onset delay	Q11. Falls asleep in 20 minutes	8.127	0.017
Block 3: sleep anxiety	Q13. Afraid of dark	6.71	0.009
	Q14. Afraid of sleeping alone	19.81	<0.0001
Block 4: sleep duration	Q16. Sleeps too little	10.250	0.006
Block 5: night awakening	Q18. Wakes up at night when parents think you are asleep	7.084	0.029
Block 6: daytime sleepiness	Q26. Feels rested after a night's sleep	6.93	0.0084

Table 4 shows the sleep habits which was significantly different in the two age groups. Trouble in sleeping was usually seen in 42.3% of study participants, belonging to age group 14-18 years while only 7.7% in the age group 11-13 years had trouble sleeping. Sleeping alone in bed, fighting with parents to go to bed and feeling hard to go to bed were seen more in 14-18 years age group. Falling asleep in others bed, ready to sleep at usual time, sleeping too little and waking up at night while

parents think that they are sleeping were seen more among the children in age group 11-13 years. Falling asleep during the day and having trouble waking up in the morning was mostly seen in 14-18 years children while going to other bed during night, having night mares, sleeps too much and taking special things while sleeping was seen more among 11-13 years children. These findings were not found to be statistically significant ( $p > 0.05$ )  
Other sleep behaviors did not have much difference in the two age groups.

**Table 5: Comparisons of sleep habits and gender**

Questions		Test statistics	P value
Block 1: bedtime resistance	Q8. Hard to go to bed	6.79	<b>0.009</b>
	Q9. Ready to sleep at usual bedtime	7.774	<b>0.021*</b>
Block 4: sleep duration	Q17. Sleeps too much	6.409	<b>0.041*</b>
Block 5: night awakening	Q18. Wakes up at night when parents think you are asleep	6.015	<b>0.049*</b>

Table 5 shows the significant difference in the sleep behavior between male and female. Females when compared to male found it hard to go to bed and woke up at night when parents thought they were sleeping on the other hand males were ready to sleep at the usual bedtime and slept too much. These differences were found to be statistically significant.

Trouble sleeping, staying up late when parents think that they are sleeping, taking special things to bed, afraid to sleep alone and waking up in the night sweating and screaming was seen more among females compared to males but was not statistically significant.

**Table 6: Mean value of sleep behavior scores.**

	Mean	Standard deviation	Percentiles		
			25th	50th	75th
Block 1	15.29	2.042	14.00	16.00	17.00
Block 2	2.08	0.788	1.00	2.00	3.00
Block 3	5.60	1.752	4.00	5.00	6.75
Block 4	2.94	0.826	2.00	3.00	3.00
Block 5	6.12	1.409	5.00	6.00	7.00
Block 6	6.12	1.060	6.00	6.00	7.00

Table 6 gives the mean score of different blocks of sleep behavior questionnaire.

**Discussion:**

Table 7: Comparison of mean score in different studies.

	Present study	Jalilolghad <sup>3</sup>	Owens <sup>9</sup>	Goodlin Jones <sup>10</sup>	Joseph HB <sup>11</sup>	Hazari et al <sup>12</sup>
CSHQ	26 Item	35 Item	56 Item	56 Item	33 Item	33 Item

Bed time resistance	15.29 (2.04)	9.3 (6)	7.06 (1.89)	9.87 (2.2)	8.24±1.77	13.5 (2.19)
Sleep onset delay	2.08 (0.78)	1.44 (0.71)	1.25 (0.53)	1.43 (0.64)	1.98±0.77	1.4 (0.75)
Sleep anxiety	5.60 (1.75)	6.67 (2.48)	4.89 (1.45)	5.88 (1.9)	7.58±2.46	7.8 (1.88)
Sleep duration	2.94 (0.83)	6.47 (1.6)	3.41 (0.93)	3.87 (1.2)	4.80±1.93	4.05 (1.36)
Night awakening	6.12 (1.409)	3.9 (1.15)	3.51 (0.89)	4.36 (1.5)	5.08±1.83	3.8(1.24)
Daytime sleepiness	6.12 (1.06)	15.4 (2.72)	9.64 (2.80)	-	15.10±3.76	15.9 (3.48)

Wide variation of the mean score was seen in different studies and the main reason being the CSHQ questionnaire used which had only 26 questions in our study while other studies used either full 56 questions or the SF with 33 questions.

The findings in the study done by Surani et al<sup>8</sup> were similar to that found in our study. The study showed that students in the age group 14-18 years (middle school) were more adherent to the traditional measures of sleep hygiene like being consistent with the bedtime and location when compared to the students in the age group 11-13 years (elementary students). But 14-18 years student also reported more disobedient behaviors, like fighting with parents over going to bed. Students in age group 11-13 years were found to often stay up when their parents thought that they were asleep compared to the other age group and this association was found significant in both the studies. Similarly another study done by Mindell et al.<sup>13</sup> also showed that 96% of school-aged children were consistent with bedtime routine while 64% of them went to sleep late. A study by Jinni et al.<sup>14</sup> reported that <10% of the children slept along with their parents and another 10% of them frequently showed bedtime resistance and difficulties sleep-onset. In Liu et al<sup>1</sup> study boys went to bed later while woke up earlier than girls but no significant differences was seen (P >0.05). Girls slept significantly longer than boys which were in contrast to that in our study. With increasing age there was a significant postponement in the children’s bedtime as well as decline in the total sleep duration.<sup>1</sup>

### Conclusion

Our study found different sleep behavior in the study participants. Trouble sleeping, sleeping alone in bed, fighting with parents to go to bed and feeling hard to go to bed was seen more in older age group. On the other hand sleeping too little and waking up at night while parents think that they are sleeping were seen more among the children in younger age group.

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