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Sleep Problems and Its Association with Socio-Demographic Factors between 3 To 9 Years of Age: An Observational Study Sleep Problems in Children – An Invisible Health Issue

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ABSTRACT

Introduction: Sleep is defined as unconsciousness from which a person can be aroused. It affects the physiology of the body and is affected by other systems and external environment sociocultural practices. There are various methods to detect and diagnose sleep disorders and one of them is child sleep habits questionnaire which is a retrospective 45 item parent questionnaire. CSHQ includes questions about various domains that include major presenting clinical sleep complains in children. This study is planned to study sleep problems and its association with socio demographic factors among children between 3 to 9 year of age.

Objectives: To estimate the prevalence of sleep problems in children age 3 to 9 years andits association with socio–demographic factors

Methods: The observational study included 400 healthy children from 3 to 9 year of age, who were healthy siblings accompanying children in opd and wards. CSHQ was explained to the parents in hindi and their response was recorded and data was analysed.

Results: Sleep problems arevery prevalent (49%) among 3 to 9 year of age which was influenced by several factors like maternal education, overcrowding in the house, socioeconomic status. Most common sleep problem was sleep anxiety (17%) followed by Bedtime Resistance (5.8%), Sleep-related breathing disorders (5.5%), Night Wakings (3.8%), Sleep duration (3.3%), Daytime sleepiness (2.3%) and Parasomnia (1.3%). Sleep onset delay was the least common sleep problem (0.8%).

Conclusions: This study concludes that sleep problems are very prevalent in children that is also influenced by several factors like lower socioeconomic status, lack of maternal education, overcrowded homes and (CSHQ) is a very effective screening tool for detecting and diagnosing sleep problems.

Key Words: *Health Issue, Sleep Problems, Socio-Demographic Factors*

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INTRODUCTION

Sleep is one of the most discussed topics during well-child visits [1]. Sleep has very important functions like neural maturation, facilitation of learning and memory, cognition, clearance of metabolic waste products generated by neural activity in the awake brain and conservation of metabolic energy [2, 3].

Lack of sleep is associated with deficits in cognitive functions, memory, attention, concentration and self-regulation, increased emotional and behavioral problems, risk taking behaviors, and negative impacts on health such as increased cardiovascular disease, obesity and metabolic dysfunctions .Childhood sleep problems may result from1.insufficient sleep quantity and 2. poor sleep quality.3.misallignment of sleep wake timing with circadian rhythms or CNS mediated hypersomnia .Insufficient sleep is usually the result of delayed sleep onset and prolonged night wakings .Bedtime resistance can also lead to short sleep duration [4, 5].

Certain children are more vulnerable to sleep problems like acute and chronic illness and pain conditions, children taking stimulant or sleep disrupting or sedating medications, hospitalized children, and children with psychiatric disorders.

But sleep problems can be seen in healthy children due to several factors like large family size, lack of maternal education, lack of good housing facilities due to poor socioeconomic status, academic pressure on children to wake up early in morning to go to school and children can sacrifice sleep.

So, it is very important to asses sleep problems in children. There are various methods to detect and diagnose sleep problems and one of them is CSHQ (Children Sleep Habit Questionnaire) which is a retrospective 45 item parent questionnaire. CSHQ includes questions about various domains that include major presenting clinical sleep complains in children: bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep disordered breathing, daytime sleepiness. This study is planned to study the sleep problems and its association with socio demographic factors among children between 3 to 9 years of age.

AIMS AND OBJECTIVES

Aim: To know the sleep problems in children and effect of socio- demographic factors on it.

Objectives- To estimate the prevalence of sleep problems in children age 3 to 9 years and its association with socio–demographic factors

Inclusion criteria:

Healthy children aged between 3 and 9 accompanying their mothers and siblings in OPD, ward

Exclusion criteria:

Children admitted in hospital or any medications or with neurological disorders or chronic illness

RESULTS

Following observations were made about the prevalence of sleep problems and their association with factors like age, gender, maternal education, anthropometry, and family size affecting the CSHQ score for various specific sleep problems. Majority of children (70%) wake up between 6 to 8 am, and only 2% wake up before 6 am. Bedtime for most of the children (82.5%) is 9 pm to 11 pm, while only 3.3 % of the children wake up after 11 pm.

Prevalence of specific sleep problems

The most common specific sleep problem is sleep anxiety (17%) followed by Bedtime Resistance (5.8%), Sleep-related breathing disorders (5.5%), Night Waking (3.8%), Sleep duration (3.3%), Daytime sleepiness (2.3%) and Parasomnia (1.3%). Sleep onset delay is the least common sleep problem (0.8%).

Age-wise prevalence and mean CSHQ scoring of specific sleep problems

No significant difference is noted in the prevalence of specific sleep problems according to age, but the maximum prevalence of sleep anxiety is seen in 4year old children (28%) followed by 3year old children (23.4%). Maximum bedtime resistance is seen in 6 years old children (8.5%) followed by 4 years (8%), 5 years (6.9%), 7 years and 9 years as (4.8%). The least bedtime resistance (3.1%) is seen in 8year old children.

Maximum sleep duration problems were seen in 6 years old children (7%) followed by 8year old children (6.2%). Maximum sleep-related breathing disorders (9.5%) were seen in 7 and 9year old children, followed by 4year old children (8%).

There is no significant difference in most of the specific sleep problems according to age except for sleep anxiety specific (p-value = 0.042). Maximum scores for sleep anxiety specific problem is seen in 4 year age group (6.36±2.37) and minimum scores (5.24±1.77) seen in 6 year old children. Also, there is a significant difference in total scores (p value=0.040) with maximum scores (44.34±7.33) seen in 4-year age group followed by the 3year age group as 43.06±5.94, minimum total scores (41.14±5.62) were seen in 8-year age group, suggesting that sleep disorders are more in lower age group and scores decrease as age increases. (Table1 and 2)

Table 1: Age-wise prevalence of specific sleep problems

Specific sleep problems	Age(years)								P value
	Total	3	4	5	6	7	8	9	
	N-400	N-47	N-50	N-58	N-71	N-63	N-65	N-42	
Bedtime Resistance	23 (6%)	02 (4.3%)	04 (8%)	04 (6.9%)	06 (8.5%)	03 (4.8%)	02 (3.1%)	02 (4.8%)	0.820
Sleep onset delay	03 (2%)	00 (0%)	00 (0%)	01 (1.7%)	01 (1.4%)	00 (0%)	01 (1.5%)	00 (0%)	0.781
Sleep duration	13 (8%)	01 (2.1%)	01 (2%)	01 (1.7%)	05 (7%)	01 (1.6%)	04 (6.2%)	00 (0%)	0.250
Sleep Anxiety	68 (43%)	11 (23.4%)	14 (28%)	07 (12.1%)	08 (11.3%)	13 (20.6%)	08 (12.3%)	07 (16.7%)	0.121
Night Waking	15 (9%)	01 (2.1%)	02 (4%)	04 (6.9%)	03 (4.2%)	01 (1.6%)	03 (4.6%)	01 (2.4%)	0.782

Parasomnia	05 (3%)	01 (2.1%)	01 (2%)	00 (0%)	00 (0%)	02 (3.2%)	01 (1.5%)	00 (0%)	0.589
Sleep-related breathing disorders	22 (14%)	00 (0%)	04 (8%)	02 (3.5%)	03 (4.2%)	06 (9.5%)	03 (4.6%)	04 (9.5%)	0.312
Daytime Sleepiness	09 (6%)	02 (4.3%)	01 (2%)	01 (1.7%)	02 (2.8%)	00 (0%)	03 (4.6%)	00 (0%)	0.529
Total	158 (100%)	17 (36.2%)	27 (54%)	20 (34.5%)	28 (39.4%)	26 (41.3%)	25 (38.5%)	14 (33.3%)	

Table 2: Age-wise mean CSHQ scoring in specific sleep problems

Specific sleep problems	**Age(years)**							**P value**
	3	**4**	**5**	**6**	**7**	**8**	**9**	
	Mean±SD	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	
Bedtime Resistance	7.89±1.83	8.26±1.79	7.78±2.1	7.62±1.97	7.67±1.59	7.39±1.48	7.47±1.85	0.224
Sleep onset delay	1.13±0.34	1.22±0.42	1.21±0.45	1.2±0.43	1.19±0.4	1.21±0.45	1.2±0.4	0.954
Sleep duration	3.79±0.98	3.82±0.8	3.9±1.07	4.08±1.28	3.92±1.1	3.86±1.04	3.78±0.97	0.725
Sleep Anxiety	5.87±2.1	6.36±2.37	5.64±1.74	5.24±1.77	5.76±1.83	5.3±1.9	5.89±2.09	0.042
Night Waking	3.83±0.99	3.84±1.06	3.79±1.1	3.72±1.07	3.81±0.82	3.74±0.92	3.64±0.93	0.958
Parasomnia	7.91±1.28	7.74±1.1	7.57±1.16	7.65±1.07	7.67±1.22	7.61±1.2	7.56±0.84	0.743
Sleep-related breathing disorders	3.21±0.46	3.36±0.75	3.31±0.57	3.32±0.89	3.41±0.82	3.27±0.76	3.29±0.97	0.890
Daytime Sleepiness	9.43±3.83	9.74±3.32	8.79±3.05	8.58±3.02	8.44±2.56	8.74±3.26	8.49±2.37	0.229
Mean total score	43.06±5.94	44.34±7.33	41.98±5.75	41.41±5.76	41.87±4.35	41.14±5.62	41.31±4.08	0.040

Family-wise prevalence and mean CSHQ scoring of specific sleep problems

Sleep anxiety is significantly related to family sizes with p-value (<0.001), with the maximum number (33.3%) of subjects with sleep anxiety are found in large families with >6 family members, followed by 18.5% in 5 family members, 10.4% in 4 family members, 8.3% in 3 family members. Other specific sleep problems have almost equal prevalence among different family sizes. (Table 3)

There is a significant difference in scoring of specific sleep problems with p-value <0.001. Maximum scores (44.39±6.04) are seen in children living in a family with >5 family members. Minimum scores are seen in children living in family sizes with 3 family members. Sleep onset delay scores decrease as family size increases, p-value= 0.026, with maximum scores seen in children living in family sizes with 3 family members. Sleep anxiety scores increase as family size increases (p-value<0.001), with maximum scores (6.52±2.27) seen in subjects with families with >5 members. The same is the case with night wakings with maximum scores (4.02±1.03) seen in subjects with families with >5 members, scores which increased significantly with increasing family sizes (p-value 0.012). Similarly, daytime sleepiness with maximum scores (9.88±3.55) is seen in subjects with families with >5 members, scores which increased significantly with increasing family sizes (p-value= 0.012). (Table 4)

Table 3: Family size-wise prevalence of specific sleep problems

Specific sleep problems		**Family size**				
	Total	**3**	**4**	**5**	**>6**	**P value**
	N-400	**N-72**	**N-154**	**N-81**	**N-93**	
Bedtime resistance	23 (5.8%)	03 (4.2%)	08 (5.2%)	05 (6.2%)	07 (7.5%)	0.804
Sleep onset delay	03 (0.8%)	00 (0%)	03 (2%)	00 (0%)	00 (0%)	0.185
Sleep duration	13 (3.3%)	03 (4.2%)	03 (2%)	03 (3.7%)	04 (4.3%)	0.705
Sleep anxiety	68 (17%)	06 (8.3%)	16 (10.4%)	15 (18.5%)	31 (33.3%)	<0.001
Night waking	15 (3.8%)	01	06	02	06	0.338

		(1.4%)	(3.9%)	(2.5%)	(6.5%)	
Parasomnia	05 (1.3%)	00 (0%)	02 (1.3%)	00 (0%)	03 (3.2%)	0.181
Sleep-related breathing disorders	22 (5.5%)	04 (5.6%)	09 (5.8%)	07 (8.6%)	02 (2.2%)	0.310
Daytime Sleepiness	09 (2.3%)	00 (0%)	04 (2.6%)	00 (0%)	05 (5.4%)	0.052
Total	158 (100%)	17 (10.8%)	51 (32.3%)	32 (20.3%)	58 (36.7%)	

Table 4: Family size-wise mean CSHQ scoring of specific sleep problems

	Total	**3**	**4**	**≥5**	**P-value**
Specific sleep problems	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	
Bedtime resistance	7.86±1.83	7.73±1.79	7.63±1.95	7.61±1.74	0.814
Sleep onset delay	1.28±0.45	1.23±0.46	1.17±0.38	1.1±0.3	0.026
Sleep duration	3.93±1.33	3.86±1.03	3.9±1.01	3.9±0.92	0.974
Sleep anxiety	5.46±1.51	5.32±1.76	5.59±2.12	6.52±2.27	<0.001
Night wakings	3.53±0.79	3.76±1.01	3.7±0.98	4.02±1.03	0.012
Parasomnia	7.64±1	7.55±1.06	7.62±0.97	7.92±1.42	0.079
Sleep related breathing disorders	3.18±0.88	3.29±0.74	3.35±0.84	3.43±0.61	0.202
Daytime Sleepiness	8.22±2.32	8.47±3.09	8.94±2.86	9.88±3.55	0.001
Total	41.1±4.49	41.21±5.4	41.9±6.03	44.39±6.04	<0.001

Socioeconomic status-wise mean CSHQ scoring of specific sleep problems

Maximum prevalence of children with a score ≥41 is seen in the lower socioeconomic class (52.2%), followed by the middle socioeconomic class (50.7%). The least prevalence is seen in the upper socioeconomic class (37.5%). There is a significant difference in total scores (p-value = 0.006). Maximum Sleep problem score is seen in lower socioeconomic status (42.92±6.051), followed by middle socioeconomic status (41.82±5.489) and upper socioeconomic status (40.44±4.611). (Table 5)

Table 5: Socioeconomic status-wise mean CSHQ scoring of specific sleep problems

Specific sleep problems	**Socioeconomic status**				
	Total	Upper	Middle	Lower	P value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Bedtime Resistance	7.71±1.813	7.31±1.498	7.81±1.731	7.79±1.970	0.115
Sleep onset delay	1.20±0.415	1.28±0.510	1.18±0.401	1.18±0.382	0.175
Sleep Duration	3.89±1.058	3.71±1.119	3.88±0.931	3.98±1.122	0.182
Sleep Anxiety	5.68±1.974	5.44±1.618	5.55±1.758	5.87±2.240	0.180
Night waking	3.77±0.983	3.76±1.081	3.69±0.958	3.83±0.963	0.451
Parasomnia	7.67±1.134	7.42±0.884	7.65±1.124	7.77±1.216	0.075
Sleep Disorder breathing	3.32±0.763	3.26±0.650	3.34±0.781	3.32±0.792	0.806
Daytime sleepiness	8.85±3.090	8.26±2.638	8.73±2.921	9.18±3.350	0.085
Total mean Score	42.07±5.672	40.44±4.611	41.82±5.489	42.92±6.051	0.006

Maternal education-wise prevalence and mean CSHQ scoring of specific sleep problems

There is no significant difference in specific sleep problems prevalence with change in maternal education, but the maximum prevalence of all specific sleep problems seen in children of illiterate mothers is 46.2%, followed by middle school educated mothers (24.7%), undergraduate mothers (14.6%), high school educated mothers (8.9%), primary school mothers (5.7%). Maximum prevalence of bedtime resistance is seen in children of illiterate mothers (8.6%) followed by undergraduate mothers (4.8%) Maximum prevalence of sleep anxiety is seen in children of high school-educated mothers (26.7%), followed by middle school-educated mothers (20.8%), Illiterate mothers (16%), UG mothers (14.5%). (Table 6)

Scores were significantly related to maternal education in two of the specific sleep problems which were bedtime resistance (p value=0.004) and sleep duration (p value=0.004). Bedtime resistance score is maximum in children with undergraduate mothers (8.13±2.01), followed by primary school-educated mothers (7.46±1.61), high school-educated mothers (7.4±1.69), Middle school educated mothers (7.4±1.65), illiterate mothers (7.33±1.43). Sleep duration scores were maximum in undergraduate mothers (4.07±1.27), illiterate mothers (3.97±0.97), Middle school educated mothers (3.83±0.79), high school-educated mothers (3.47±0.8). (Table 7)

Table 6: Maternal education-wise prevalence of specific sleep problems

Specific sleep problems	Maternal education						
	Illiterate	<Primary	Middle school	High school	Under Graduate	Total	P value
	N-163	N-36	N-109	N-30	N-62	N-400	
Bedtime resistance	14 (8.6%)	01 (2.8%)	04 (3.7%)	01 (3.3%)	03 (4.8%)	23 (5.8%)	0.367
Sleep onset delay	01 (0.6%)	00 (0%)	01 (0.9%)	00 (0%)	01 (1.6%)	03 (0.8%)	0.878
Sleep duration	10 (6.1%)	01 (2.8%)	01 (0.9%)	01 (3.3%)	00 (0%)	13 (3.3%)	0.081
Sleep anxiety	26 (16%)	03 (8.3%)	22 (20.2%)	08 (26.7%)	09 (14.5%)	68 (17%)	0.279
Night waking	06 (3.7%)	02 (5.6%)	02 (1.8%)	00 (0%)	05 (8.1%)	15 (3.8%)	0.214
Parasomnia	02 (1.2%)	00 (0%)	02 (1.8%)	01 (3.3%)	00 (0%)	05 (1.3%)	0.627
Sleep-related breathing disorders	11 (6.8%)	02 (5.6%)	03 (2.8%)	01 (3.3%)	05 (8.1%)	22 (5.5%)	0.537
Daytime sleepiness	03 (1.8%)	00 (0%)	04 (3.7%)	02 (6.7%)	00 (0%)	09 (2.3%)	0.196
Total	73 (46.2%)	9 (5.7%)	39 (24.7%)	14 (8.9%)	23 (14.6%)	158 (100%)	

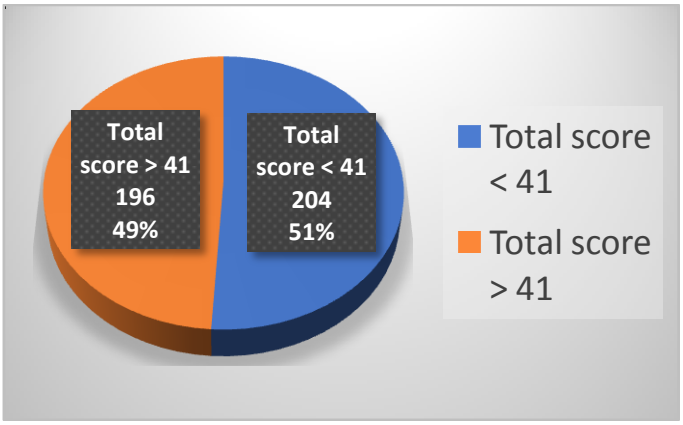
Table 7: Maternal education-wise mean CSHQ scoring of specific sleep problems

Specific sleep problems	Maternal education					
	Illiterate	<Primary	Middle school	High school	Under Graduate	p value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Bedtime resistance	7.33±1.43	7.46±1.61	7.4±1.65	7.4±1.69	8.13±2.01	0.004
Sleep onset delay	1.28±0.45	1.23±0.44	1.1±0.31	1.13±0.38	1.2±0.41	0.257
Sleep duration	3.97±0.97	3.83±0.79	3.97±0.96	3.47±0.8	4.07±1.27	0.004
Sleep anxiety	5.28±1.68	5.71±2.14	6.1±1.71	5.6±1.66	5.7±2.07	0.560
Night waking	3.89±0.92	3.88±0.96	3.7±0.92	3.66±1.13	3.72±0.97	0.514
Parasomnia	7.81±0.98	7.76±1.34	7.6±1.59	7.55±0.88	7.63±1	0.684
Sleep related breathing disorders	3.42±0.73	3.32±0.65	3.37±0.61	3.29±0.78	3.29±0.86	0.904
Daytime sleepiness	8.94±2.93	9.36±3.22	9.4±3.94	8.29±2.24	8.6±3.11	0.134

Table 8: Children with total CSHQ score above cutoff value (≥41)

	NUMBER	PERCENT
Total score < 41	204	51%
Total score ≥ 41	196	49%
Total	400	100%

As is seen in Table 8and Graph 1 almost half of the study subjects have a total CSHQ score more than the cut-off (≥41).



Graph 1: Children with total CSHQ score above cutoff value (≥41)

DISCUSSION

The present study entitled "Study of sleep problems and its association with socio-demographic factors among children between 3 to 9 years of age: An observational study" is conducted in the Outdoor Patient Department, Indoor wards, and Immunization clinic of J.A. Group of hospitals, Gajra Raja Medical College, Gwalior to know the prevalence of sleep problems in this age group and its association with sociodemographic factors.

Utilizing a sample of 400 children, this study demonstrated that sleep problems are very common in Gwalior children of the 3-to-9-year age group. Almost, half (49%) of the study subjects have CSHQ scores more than the cutoff (>41). Similarly, Bhavnet Bharti et al [6] in their study among 103 school-going children in the age group (3 to 10 years) residing in Chandigarh found sleep problems prevalence to be 42.7 %. RiyaMary Tharakan et al [7] did a study on sleep patterns and sleep problems in children aged 6 to 15 years in Karnataka as perceived by their parents and found that 48% of the children had sleep disturbances. J.C. Suri et al found a prevalence of sleep problems to be around 25 % among Delhi children, this could be because they used a different questionnaire (PSQ) in place of CSHQ.

Sleep anxiety appears to be the most prevalent in this age group, with approximately 49% of children having the problem. Other kinds of sleep problems affecting children's sleep quality were Bedtime Resistance (5.8%), Sleep-related breathing disorders (5.5%), Night Waking (3.8%), Sleep duration (3.3%), Daytime sleepiness (2.3%), Parasomnia (1.3%), Sleep onset delay was least common sleep problem as (0.8%).

The mean duration of night time sleep was almost the same throughout early childhood, i.e., 9.22 hours. Raphaele Reine Lydie van Litsenburg et al [8] in her study among dutch children (ages of 7 and 12 years) found that bedtime and wake-up time was later for older children ($p<.001$) Mean sleep duration was 10.66 h (95% CI, 10.57–10.75; range, 7.00–14.5 h) and decreased significantly with child age. The mean sleep duration was similar to our study.

Maximum Sleep problem score was seen in lower socioeconomic status (42.92 ± 6.051), followed by middle socioeconomic status (41.82 ± 5.489) and upper socioeconomic status (40.44 ± 4.611). This can be because lower socioeconomic status children have fewer facilities like separate air-conditioned rooms for sleeping, and poor hygienic conditions. Children are likely to be exposed to parental mood disturbances due to lack of money and jobs which could create an environment of insecurity that may increase the risk of sleep problems. Also, parents are mostly daily wage workers, they are more worried about earning bread and a roof for the family and sleep is a first-world problem for them.

Similarly, Tianming Zhao et al [9] in their study of 3636 preschool children (3 to 6 years) in 4 cities in China found sleep problems at 11.8% in a family with incomes <300 CNY, 32.5 % in families with incomes of 3000 to 4999 CNY, 38.0 % in a family with incomes 5000 to 10,000 CNY, 15.7% in a family with incomes >10,000 CNY S.

In our study, we have not seen any significant difference in the prevalence of various sleep problems in relation to the gender of the child. Similar findings were observed by J.C. Suri et al [10] in their study among 2475 Indian school-going children in the age group (4- to 10-year-old), they found insomnias equally distributed in both genders.

CONCLUSION

This study concludes that sleep problems are very prevalent in children and it is influenced by several factors like lower socioeconomic status, lack of maternal education, overcrowded homes.

Child Sleep Health Questionnaire (CSHQ) is a very effective screening tool for detecting and diagnosing sleep problems

IMPLICATIONS

Sleep problems are highly prevalent among otherwise healthy children also, and it is a known fact that sleep problems can lead to deficits in cognitive functions, memory, attention, concentration and self-regulation, increased emotional and behavioral problems, risk taking behaviors, and negative impacts on health such as increased cardiovascular disease, obesity and metabolic dysfunctions. So why not use a simple screening tool like Child Sleep Health Questionnaire (CSHQ) for detecting and diagnosing sleep problems early for betterment of child's future.

KEY MESSAGE

WHAT IS ALREADY KNOWN?

Sleep problems are common among children and are influenced by various factors.

WHAT THIS STUDY ADDS?

Prevalence of sleep problems in Gwalior children is more than expected, sleep related breathing disorders was almost double in males than females, sleep problems are more common in middle socioeconomic status than lower and upper socioeconomic status and sleep problems are equally prevalent in age group 3 to 9 year.

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