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Assessment Of Spectrum Of Sleep Disorders Among Children Aged 2-12 Years - A Cross Sectional Study In A Tertiary Care Hospital

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ABSTRACT

Background: Sleep disorders in children are increasingly recognized as significant health issues that can affect cognitive, emotional, and physical development. Identifying and addressing these disorders early is crucial for promoting healthy growth and development.

Aim: To assess the sleep duration and identify sleep disorders among children aged between 2-12 years in a tertiary care hospital setting.

Methods: We conducted a hospital-based cross-sectional study in the Department of Paediatrics (Well Baby Clinic and Immunization Clinic) at Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu district, between 2023–2024. Following institutional Ethics Committee approval and informed written assent, 205 children attending the well-baby and immunization clinics were selected based on predetermined inclusion and exclusion criteria.

Results: Among 205 children, 34.6% had sleep disorders, with the most common being disorders of initiating and maintaining sleep (23.9%), excessive somnolence (22.5%), and sleep-wake transition disorders (19.7%). Significant associations were found between sleep disorders and infancy sleep issues ($p = 0.001$), family history of sleep disorders ($p = 0.001$), absence of parental presence during sleep ($p < 0.001$), and having siblings ($p = 0.04$). Gender was not significantly associated ($p = 0.96$).

Conclusion: Our study found that 34.6% of children had sleep-related issues, most commonly difficulties in initiating and maintaining sleep. These disorders were strongly linked to sleep issues in infancy, family history, lack of parental presence during sleep, and having siblings. Effective management of pediatric sleep disorders should include routine screening, parental education, and a comprehensive treatment approach.

Keywords: Sleep disorders, children, sleep duration, cross-sectional study, tertiary care hospital.

INTRODUCTION

Sleep is essential for the physical, cognitive, and emotional development of children. However, sleep disorders are increasingly recognized as a significant concern in pediatric populations, with implications for long-term health and well-being. Sleep disturbances in children can manifest in various forms, including difficulties in initiating and maintaining sleep, excessive daytime sleepiness, parasomnias, and sleep-related breathing disorders [1,2]. Studies have shown that the prevalence of sleep disorders in children ranges widely, with some estimates suggesting that up to 50% of children experience some form of sleep disturbance during childhood [3].

Disorders of initiating and maintaining sleep, commonly referred to as pediatric insomnia, are among the most frequently reported sleep issues in children. These disorders can have far-reaching consequences, including behavioral problems, poor academic performance, and emotional difficulties [4,5]. Excessive daytime sleepiness, another common sleep issue, is often linked to inadequate sleep quantity or quality and can impair a child's ability to concentrate and perform daily activities effectively [6].

The etiology of sleep disorders in children is multifactorial, with biological, psychological, and environmental factors playing critical roles. For instance, there is evidence suggesting that sleep disorders during infancy can persist into later childhood, highlighting the importance of early identification and intervention [7]. Additionally, a family history of sleep disorders has been identified as a significant risk factor, with studies showing that children with a familial predisposition are more likely to develop sleep-related issues themselves [8].

Parental behaviors and the sleep environment also influence children's sleep patterns. For example, parental presence during sleep has been associated with a reduced risk of sleep disturbances, while the presence of siblings has been linked to an increased likelihood of sleep disorders, potentially due to disruptions caused by shared sleeping arrangements [9,10].

Given the prevalence and impact of sleep disorders on children's health, there is a need for routine screening and early intervention in pediatric healthcare settings. Educating parents about healthy sleep practices and the risk factors for sleep disorders can also play a vital role in prevention and management [11]. This study aims to assess the spectrum of sleep disorders among children aged 2-12 years in a tertiary care hospital, focusing on the prevalence and types of sleep disturbances and identifying associated risk factors.

METHODOLOGY

Study participants:

Children aged 2-12 years attending outpatient department during the study period.

Inclusion criteria –

- Children attending OPD clinic at SSSMCRI
- Age & sex: 2-12 years of both genders
- Fully Immunized
- Anthropometry appropriate for age

Exclusion criteria –

- Children with acute /chronic medical illness
- Children on medications
- Any birth complications / congenital diseases

Sample size

Sample size calculation – sample size calculation is based on the previous study [12], the prevalence of disorders in children in between age group 2-12 is 34.2%
 $n = 4pq/l^2$ where $p = 34.2\%$, $q = 100 - 34.2 = 65.80$

$n = 4 \times 34.2 \times 65.8 / 7^2 = 9001.44 / 49 = 183.70$ (+10% non-response error)
 $= 183.70 + 18.37 = 202.07 \approx 205$

Sampling:

Consecutive sampling (all children fulfilling the inclusion and exclusion criteria and gave informed assent from parents were taken as study participants)

Study duration:

18 months between 30th September 2022 to 30th March 2024

Study procedure:

Before any data was collected, parents were fully told about the study and their informed consent was acquired. A semi structured questionnaire was utilized to gather data from the participant's parents. The interview schedule included background questions about parent's educational attainment, socioeconomic status, age, and gender. In the last six months, data on sleep problems were gathered using the SDSC. The questionnaire, which was based on the scale, had 26 questions about irregular sleeping patterns and sleep behaviours. The answers to the questions were ranked according to how frequently the symptom occurred. Participants with a total score of higher than 39 were deemed to have sleep disorders once the total score was calculated.

Individual sleep disorders were evaluated using the 26 questions by adding together the results of specific question groups. Among these were SHY, sleep breathing disorders, arousal disorders, sleep-wake transition disorders, DIMS, and disorders of excessive somnolence. This is consistent with the diagnosis of sleep disorders such as hypersomnia, sleep-related breathing problems and circadian rhythm sleep disorders in the 10th version of the International Classification of Diseases (ICD-10). Positive symptoms were identified for each question if the frequency of the symptom was three or more times per week. Parents of kids with sleep disorders received education about good sleep hygiene.

RESULTS

The study included 205 children, with almost equal numbers of boys and girls.

Table 1: Age, gender distribution, and other socio-demographic characteristics among the study participants (N=205)

Characteristics	Frequency (%)
Age group	
5 and less years	97 (47.3)
6 - 10 years	78 (38.1)
11-12 years	30 (14.6)
Gender	
Male	103 (50.2)
Female	102 (49.8)
Father's education	
Illiterate	12 (5.8)
High school/Secondary school	139 (67.8)
Graduate	54 (26.4)
Mother's education	
Illiterate	19 (9.3)
High school/Secondary school	157 (75.6)
Graduate	29 (14.1)
Father's occupation	
Professional/Semi professional	62 (30.2)
Skilled/Semiskilled	129 (62.9)
Unemployed	14 (6.8)
Mother's occupation	
Professional/Semi professional	39 (19.0)
Skilled/Semiskilled	54 (26.3)
Unemployed/Housewife	112 (54.6)
Socio economic status	
Lower	42 (20.5)
Middle	140 (68.3)
Upper	23 (11.2)
Sleep disorders at infancy	
Present	11 (5.4)
Absent	194 (94.6)

Family history of sleep disorders	
Present	16 (7.8)
Absent	189 (92.2)
Family members suffering from sleep disorders	
Grandmother	7 (43.7)
Grandfather	6 (37.5)
Father	2 (12.5)
Mother	1 (6.7)
Siblings	
Yes	89 (43.4)
No	116 (56.6)
Presence of parent during sleep	
Yes	167 (81.4)
No	38 (18.6)

Most of the children were 5 years old or younger. Many parents had finished high school, and most fathers worked in skilled jobs, while more than half of the mothers were housewives. Most families were middle class. Only a few children had sleep issues during infancy or a family history of sleep problems, mainly among grandparents. About 43% of the children had siblings, and most slept with a parent nearby (Table 1).

Table 2: Distribution of sleep disorders among study participants (N=205)

Characteristics	Frequency (%)
Present	71 (34.6)
Absent	134 (65.4)
Domains assessed	
Disorders of initiating and maintaining sleep	17 (23.9)
Sleep breathing disorders	12 (16.9)
Disorders of arousal	9 (12.7)
Sleep wake transition disorders	14 (19.7)
Disorders of excessive somnolence	16 (22.5)
Sleep hyperhidrosis	5 (7.1)

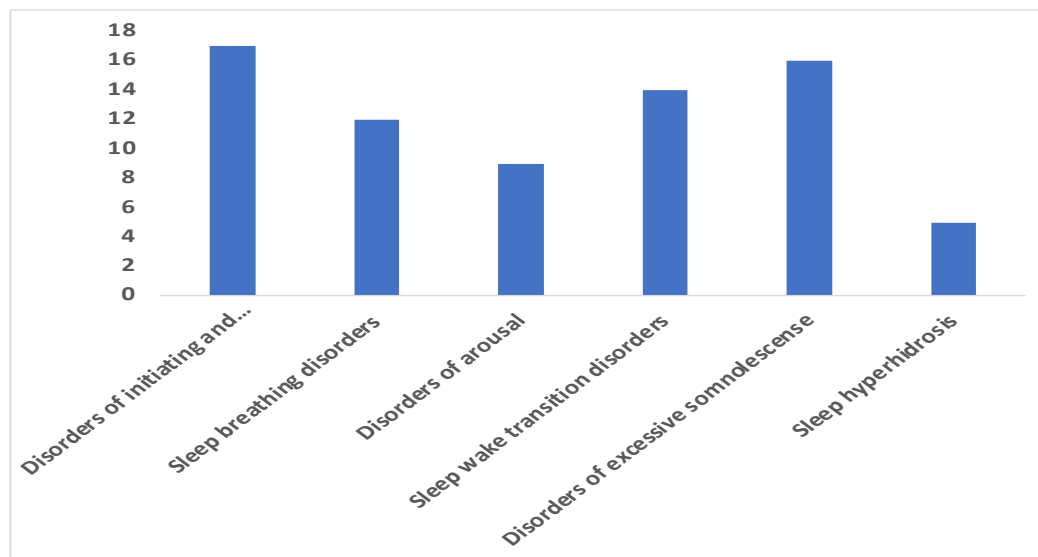
Among the 205 children studied, 34.6% were diagnosed with sleep disorders, while 65.4% did not show any sleep-related issues. The most common disorders identified were difficulties with initiating and maintaining sleep (23.9%) and excessive somnolence (22.5%). Other prevalent issues included sleep-wake transition disorders (19.7%), sleep breathing disorders (16.9%), arousal disorders (12.7%), and sleep hyperhidrosis (7.1%) (Table 2).

Table 3: Association between various independent variables with presence of sleep disorders (N=205)

Characteristics	Yes	No	P value
Sleep disorders at infancy			

Present	9 (81.9)	2 (18.1)	0.001
Absent	62 (31.9)	132 (68.1)	
Family history of sleep disorders			
Present	13 (81.2)	3 (18.8)	0.001
Absent	58 (30.6)	131 (69.4)	
Parental presence during sleep			
Yes	35 (20.9)	132 (79.1)	<0.001
No	36 (94.7)	2 (5.3)	
Siblings			
Yes	17 (19.1)	72 (80.9)	0.04
No	54 (46.5)	62 (53.5)	
Gender			
Male	36 (34.9)	67 (65.1)	0.96
Female	35 (34.3)	67 (65.7)	

The study examined the association between various independent variables and the presence of sleep disorders among the 205 participants. A significant link was found with sleep disorders in infancy ($p = 0.001$), where 81.9% of those with early sleep disorders continued to experience them, compared to 31.9% without such a history. A family history of sleep disorders was also significantly associated ($p = 0.001$), with 81.2% of those affected having a family history, compared to 30.6% without. Parental presence during sleep showed a strong correlation ($p < 0.001$); 94.7% of those without parental presence experienced sleep disorders, compared to 20.9% with parental presence. The presence of siblings was also associated ($p = 0.04$) with sleep disorders, with 46.5% of those with siblings affected, compared to 19.1% without siblings. Gender, however, did not show a significant association ($p = 0.96$), with similar rates of sleep disorders in males (34.9%) and females (34.3%) (Table 3). These findings highlight the importance of identifying early risk factors such as infancy sleep disorders, family history, parental presence, and sibling presence in the effective management and intervention of pediatric sleep disorders.



DISCUSSION

Sleep is a critical component of a child's overall health and development, playing a vital role in physical growth, cognitive function, and emotional well-being (13). During the early years of life, sleep patterns undergo significant changes as the brain rapidly develops and the circadian rhythm matures (14). These developmental changes often contribute to sleep disturbances, which are common in childhood (15). The importance of addressing sleep disorders in children cannot be overstated, as these disorders can have far-reaching implications, including

behavioral problems, learning difficulties, and an increased risk of chronic conditions later in life (16).

Environmental factors, such as the presence of parents during sleep and the overall sleep environment, significantly influence a child's sleep quality (17). Secure attachments and proper sleep hygiene practices are crucial in preventing sleep disturbances (18). Moreover, genetic predisposition plays a key role in the likelihood of developing sleep disorders. Variations in genes that regulate the circadian rhythm, such as *CLOCK*, *PER3*, and *ADORA2A*, have been linked to these disorders, emphasizing the importance of considering family history when assessing sleep issues in children (19). Addressing these factors through comprehensive management strategies, including behavioral and pharmacological interventions, is essential for improving sleep health in pediatric populations (20,21,22).

Our study found a high prevalence of sleep disorders among children aged 2-12 years, which can be attributed to several developmental, environmental, and familial factors. Sleep disturbances are common during early childhood due to rapid brain development and the ongoing maturation of sleep architecture, as reflected in the 23.9% prevalence of disorders in initiating and maintaining sleep observed in our study (23). Environmental factors also play a significant role, with parental presence during sleep being associated with fewer sleep disturbances ($p < 0.001$), highlighting the importance of secure attachments and sleep hygiene (24).

Genetic predisposition is another critical factor, with a significant association between a family history of sleep disorders and their presence in children ($p = 0.001$). Variations in genes regulating the circadian clock, such as *CLOCK*, *PER3*, and *ADORA2A*, have been linked to sleep disorders (25). The high prevalence of sleep breathing disorders (16.9%) in our study may also be influenced by underlying medical conditions, like obstructive sleep apnea, often associated with hypertrophy of the tonsils and adenoids in children (26).

Psychosocial factors, including socioeconomic status and family dynamics, contribute to sleep disturbances. Most of our participants were from middle-class backgrounds, and parental education levels are known to affect sleep practices and environments (27). Circadian rhythm disruptions, often due to inconsistent sleep schedules and excessive screen time, are significant contributors to sleep disorders, as seen in the 22.5% prevalence of disorders of excessive somnolence (28).

Parenting practices, including consistent bedtime routines and appropriate sleep environments, are crucial in preventing and managing sleep disorders. The presence of siblings also appears to influence sleep patterns, potentially through shared environments or behavioral modeling (29). Effective management of sleep disorders in children requires a comprehensive approach, including behavioral interventions like cognitive-behavioral therapy for insomnia (CBT-I), sleep hygiene education, and the establishment of consistent sleep routines (30). Pharmacological interventions, such as melatonin for circadian rhythm disorders, may be considered but should be used judiciously under medical supervision (31).

CONCLUSION

In conclusion, 34.6% of children in our study had sleep-related problems. The most common issues were difficulties with initiating and maintaining sleep (23.9%) and excessive daytime sleepiness (22.5%). Other prevalent disorders included sleep-wake transition issues (19.7%) and sleep breathing problems (16.9%). Significant factors associated with these sleep disorders included a history of sleep issues during infancy, family history of sleep disorders, absence of parental presence during sleep, and having siblings. Addressing these issues effectively requires routine screening, educating parents, applying multifactorial treatment approaches, and fostering interdisciplinary collaboration and ongoing research.

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