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Original Research Article

Sleep Disturbances and Their Associations with Socio-Demographic, Personal, Family, and Environmental Factors among Children Aged 3–12 Years: A Cross-Sectional Hospital-Based Study

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Abstract

Background: Sleep is a critical determinant of physical, cognitive, and emotional development in children. However, the prevalence of sleep disturbances among Indian children and their association with various socio-demographic, personal, family, and environmental factors remain underexplored.

Objective: To assess the prevalence, frequency, and types of sleep disturbances and their associations with selected socio-demographic, personal, family, and environmental variables among children aged 3 to 12 years.

Methods: A hospital-based cross-sectional study was conducted on 200 children attending the pediatric department of a tertiary care hospital in Noida, India. Sleep patterns were assessed using the validated Hindi version of the Sleep Disturbance Scale for Children (SDSC). Data on demographic, familial, and environmental variables were collected through caregiver interviews. Statistical analysis was performed using SPSS 22, with significance set at $p<0.05$.

Results: Sleep disturbances were observed in 27% of children, with 23% having borderline and 4% pathological disturbances. The most prevalent types included disorders of initiating and maintaining sleep (33.3%), sleep breathing disorders (22.2%), and sleep-wake transition disorders (22.2%). Significant associations were found with urban residence ($p=0.002$), higher BMI ($p<0.01$), and nuclear family structure ($p=0.001$). No significant difference was found based on gender.

Conclusion: Sleep disturbances are common in children, particularly those living in urban areas, with higher BMI and from nuclear families. Early identification and targeted interventions are crucial to mitigate long-term developmental impacts.

Keywords: Sleep disturbance, Children, SDSC, Urban health, Pediatric sleep, Sleep hygiene, Family structure, BMI, India.

Introduction

Sleep is a critical physiological process essential for children's physical growth, emotional regulation, and cognitive development. Adequate and good-quality sleep supports memory consolidation, learning, and overall well-being, especially during early childhood—a period marked by rapid neurodevelopment [1,2].

Sleep disturbances in children are increasingly recognized as a global health concern, with prevalence rates ranging from 5% to 40%, depending on definitions and populations studied [3,4]. Common pediatric sleep problems include difficulties in initiating and maintaining sleep, excessive daytime sleepiness, parasomnias, and sleep-disordered breathing. These issues, if unrecognized, may lead to significant short- and long-term consequences such as academic underachievement, behavioral problems, emotional dysregulation, and even physical health issues like obesity and growth impairment [5,6]. Sleep disturbances in childhood can also adversely affect parental sleep and family functioning, further amplifying their impact [7].

The etiology of sleep disturbances is multifactorial, involving personal factors (age, temperament, BMI), environmental influences (noise, lighting, screen exposure), and family-related characteristics such as parental education, employment status, and household structure [8]. Urban environments, in particular, have been associated with disrupted

sleep patterns in children due to exposure to artificial light, late-night screen use, and irregular routines [9].

Despite growing global research, sleep disturbances in Indian children remain an underexplored public health issue. Cultural sleep practices such as co-sleeping, limited parental awareness, and lack of routine pediatric screening contribute to underdiagnosis and delayed intervention [10].

Given this context, the present study was undertaken to assess the prevalence, frequency, and types of sleep disturbances in Indian children aged 3 to 12 years and to examine their associations with selected socio-demographic, personal, family, and environmental factors.

Materials and Methods

Study Design and Participants: This hospital-based cross-sectional study was conducted in the Department of Pediatrics, ESIC Model Hospital, Noida (Uttar Pradesh), over a period of one year from July 2023 to June 2024. A total of 200 children aged 3 to 12 years, of either sex, were randomly enrolled from outpatient and inpatient services. Only children who had recovered from acute illnesses were included, and informed consent was obtained from parents or legal guardians. Ethical clearance was obtained from the Institutional Ethics Committee.

Inclusion criteria included children aged 3–12 years whose parents consented and who met the age and health criteria.

Exclusion criteria comprised children with congenital anomalies, chronic systemic illnesses (neurological, renal, cardiac, metabolic), neurodevelopmental or psychiatric disorders, chronic infections (e.g., tuberculosis, hepatitis), and those on medications known to affect sleep (e.g., antiepileptics, barbiturates).

Data Collection and Sleep Assessment Tool

A structured caregiver interview was conducted using a pre-tested proforma in the local language. Data were collected on sociodemographic (age, sex, residence, family type, socioeconomic status), personal (birth order, BMI, activity levels, screen time), family (conflict, chronic illness), and environmental factors (co-sleeping, background noise, use of night lights). Socioeconomic status was assessed using the Modified Kuppuswamy Scale.

Sleep disturbances were evaluated using the Sleep Disturbance Scale for Children (SDSC), a validated tool consisting of 26 items across six domains: initiating/maintaining sleep, breathing disorders, arousal disorders, sleep-wake transition disorders, excessive somnolence, and sleep hyperhidrosis. A Hindi-translated version was used with proper linguistic validation, including forward/backward translation and pilot testing. A total SDSC score ≥39 was considered indicative of sleep disturbance.

Statistical Analysis: Data were entered in Microsoft Excel and analyzed using SPSS version 22. Continuous variables were expressed as mean ± standard deviation, while categorical data were presented as frequencies and percentages. Chi-square test was used for categorical comparisons, and t-tests for continuous variables. A p-value <0.05 was considered statistically significant

Baseline Characteristics of Study Participants: A total of 200 children were included in the study. The majority were aged 6–10 years (70%), followed by 3–5 years (17.5%) and 11–12 years (12.5%). Boys comprised 51.5% (n=103) and girls 48.5% (n=97). Most participants (71%) resided in urban areas, and 88.5% belonged to nuclear families. The mean body mass index (BMI) was 14.64 ± 2.56 kg/m². Socioeconomic status, based on the Modified Kuppuswamy Scale, was predominantly middle and lower-middle class (table 1).

Table 1: Baseline characteristics of study participants (N=200)

Characteristic	Category	Frequency (%)
Age group (years)	3–5	35 (17.5)
	6–10	140 (70.0)
	11–12	25 (12.5)
Gender	Male	103 (51.5)
	Female	97 (48.5)
Residence	Urban	142 (71.0)
	Semi-urban	29 (14.5)
	Rural	29 (14.5)
Family Type	Nuclear	177 (88.5)
	Joint	23 (11.5)
Mean BMI (kg/m²)	–	14.64 ± 2.56

Prevalence and Types of Sleep Disturbances: Out of the 200 children, 27% (n=54) were found to have sleep disturbances based on SDSC scores (≥39).

Among these, 46 (23%) were classified as having borderline sleep issues, and 8 (4%) had pathological sleep disturbances. The most common disturbance identified was disorder of initiating and maintaining sleep (33.3%), followed by sleep breathing disorders (22.2%) and sleep-wake transition disorders (22.2%). Other types such as arousal disorders, excessive somnolence, and sleep hyperhidrosis were less prevalent (table 2).

Table 2: Prevalence and types of sleep disturbances among children (N=200)

Sleep Disturbance Type	No. of Children (n=54)	% of Sleep Disturbances	% of Total Sample
Disorder of initiating/maintaining sleep	18	33.3%	9.0%
Sleep breathing disorder	12	22.2%	6.0%
Sleep-wake transition disorder	12	22.2%	6.0%
Disorder of arousal	5	9.2%	2.5%
Sleep hyperhidrosis	5	9.2%	2.5%
Excessive somnolence	2	3.7%	1.0%

Associations between Sleep Disturbances and Other Variables: Sleep disturbances were significantly more common among children aged 6–10 years (p=0.006), those from urban areas (81.5% of affected cases; p=0.002), and those living in nuclear families (p=0.001). Children with sleep disturbances had a significantly higher mean BMI (16.89 ± 3.81 kg/m²) compared to those without (9.45 ± 2.04 kg/m²) (p<0.01).

There was no statistically significant association with gender (table 3).

Table 3: Association between sleep disturbances and demographic variables (N = 200)

Variable	Category	Sleep Disturbance Present (n=54)	Sleep Disturbance Absent (n=146)	p-value
Age Group (years)	3–5	3 (5.6%)	32 (21.9%)	**0.006***
	6–10	42 (77.8%)	98 (67.1%)	
	11–12	9 (16.6%)	16 (11.0%)	
Residence	Urban	44 (81.5%)	98 (67.1%)	**0.002***
	Semi-urban	6 (11.1%)	23 (15.8%)	
	Rural	4 (7.4%)	25 (17.1%)	
Family Type	Nuclear	47 (87.0%)	130 (89.0%)	**0.001***
	Joint	7 (13.0%)	16 (11.0%)	
Gender	Male	25 (46.3%)	78 (53.4%)	0.62
	Female	29 (53.7%)	68 (46.6%)	
BMI (kg/m²)	Mean ± SD	16.89 ± 3.81	9.45 ± 2.04	**<0.01***

***Statistically significant; SD = Standard Deviation**

Discussion

This study found that 27% of children aged 3–12 years had sleep disturbances, with 23% classified as borderline and 4% as pathological based on SDSC scores. These findings underscore the importance of early identification and evaluation of sleep-related issues during childhood, especially in the Indian context where such data is scarce.

The observed prevalence is comparable to findings by Akshara Binod Nair et al., who reported a sleep disorder rate of 34.6% among Indian children in a hospital-based study, with the most common type being disorders of initiating and maintaining sleep (23.9%) [11]. Similar results were noted in a study by Catarina Andrade et al., where approximately 36.3% of children exhibited sleep disturbances, although they found no significant association with age or sex [12].

In our study, the most frequent subtype was disorders of initiating and maintaining sleep (33.3%), followed by sleep breathing disorders (22.2%) and sleep-wake transition disorders (22.2%). These disturbances are consistent with the developmental sleep patterns in childhood and may reflect behavioral issues such as poor sleep hygiene, irregular routines, and bedtime resistance, as highlighted in global literature [13].

Notably, age group was significantly associated with sleep disturbances (p = 0.006), with children aged 6–10 years being most affected. This finding may reflect a transitional developmental period during which children gain more independence but also face increasing academic and social demands.

Other studies have also reported greater sleep-onset difficulties and reduced sleep duration among school-aged children and preadolescents [14,15].

Urban residence was strongly associated with sleep disturbances ($p = 0.002$). Urban children are more likely to be exposed to environmental noise, later school start times, irregular schedules, and increased screen exposure, all of which have been linked to poor sleep quality [16]. Desai et al. found that urban children experienced higher rates of disrupted sleep due to background noise, electronics use, and psychological stress related to academics [9].

Children from nuclear families had significantly more sleep disturbances ($p = 0.001$) compared to those from joint families. Family structure influences bedtime routines and parental supervision. Joint families may provide a more regulated home environment, leading to better sleep hygiene. Rabelo et al. also found that children in nuclear families, particularly those with external stressors like working parents or parental illness, were more likely to experience poor sleep quality [17]. Another key finding was the significantly higher BMI among children with sleep disturbances (16.89 ± 3.81 vs. 9.45 ± 2.04; $p < 0.01$). Higher BMI has been consistently associated with sleep-related breathing disorders and poor sleep quality in both adults and children. Disrupted sleep alters metabolic regulation and hormonal balance (e.g., ghrelin/leptin), increasing obesity risk [18]. These findings are aligned with previous Indian and international data that establish a bidirectional relationship between obesity and sleep disorders [19]. Interestingly, no significant gender differences were observed in sleep disturbance prevalence, which aligns with studies by Nair et al. and Andrade et al. [11,12]. Although some literature suggests boys are more prone to sleep-disordered breathing and girls to insomnia, this may vary with age and cultural practices.

Conclusion and Recommendations

In this study, sleep disturbances were observed in 27% of children aged 3 to 12 years, with the most common being disorders of initiating and maintaining sleep, followed by breathing and transition-related disorders. Significant associations were found with urban residence, nuclear family type, higher BMI, and the 6–10-year age group, while no gender differences were observed. These findings highlight the need for routine screening and early identification of sleep problems in pediatric practice. Educating parents on healthy sleep practices, limiting screen exposure, maintaining consistent bedtime routines, and addressing modifiable risk factors such as obesity may help reduce the burden of sleep disturbances in children. Pediatricians and primary care providers should be trained to recognize and manage these issues, especially in high-risk groups, to support optimal growth and development.

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