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A Multicentre, Prospective, Observational Study On Sleep Problems In Indian Children

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Abstract

Background: *Sleep has several vital functions in children. Inadequate sleep can profoundly impact children's physical and mental health, learning, development, and behaviour. Although sleep studies were done in the past in India, we do not have multiregional/multicentric data in the previous studies. Hence to understand the sleep patterns and problems in Indian children, we conducted a multicentre study at 10 teaching hospitals across India.*

Materials and Methods: *Children between the ages of 1-18 years attending hospitals for minor ailments and immunizations were included in the study. Children with medical disorders or medications that can significantly affect sleep were excluded from the study. Pediatric residents asked the parents in detail about their children's sleep patterns and habits using a basic sleep screening questionnaire. Parents who reported sleep problems in their children were asked a more detailed questionnaire (Paediatric Sleep questionnaire-PSQ by Chervin et al.) on their children's sleep patterns and habits.*

Results: *A total of 2235 children were recruited in the study, of which 53% were male and 47% were female. Sleep problems were reported by 30.1% of the parents included in the study. There was a variation in sleep timings between weekdays and weekends in 31.2% of the children studied. Around 28% of children with sleep problems did not get adequate sleep. Sleep pattern was reported to be altered by the COVID pandemic in 11.5% of children. The common final diagnoses across all age groups include mouth breathing (8.3%), bruxism (7.3%), sleep talking (7.1%), snoring (6.7%), restless sleep (5.1%), nightmares (4.8%), bed wetting (4.3%), delayed sleep-wake phase disorder (2.3%), behavioural insomnia (2.3%), sleep terrors (1.6%), nocturnal leg pains (1.6%) and confusional arousals (1%)*

Conclusion: *The study showed that sleep problems exist in a significant proportion of the children studied. The study also highlighted that a significant percentage of Indian children are sleep deprived. Hence, there is a need for parental education about sleep problems and hygiene in children.*

Keyword : *Sleep problems children; Sleep hygiene; Sleep deprivation*

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I. Introduction

Sleep has several vital functions in children. Inadequate sleep can profoundly impact children's physical and mental health, learning, development, and behaviour [1]. Some international studies have shown that up to 50% of children can experience sleep problems during their lifetime [2]. Although sleep studies were done in the past in India, we do not have multiregional/multicentric data in the previous studies. Our study is the first multicentre study done across different centres in India looking at sleep habits and problems in children.

II. Material and Methods

A prospective observational study was conducted between January 1st, 2022, to June 30th, 2023, at ten teaching hospitals across the country. Children between the ages of 1 to 18 years attending the hospitals for minor ailments and immunization were included in the study. Children with medical disorders or medications that can significantly affect sleep were excluded from the study. The study was approved by the ethical committees of all the participating institutes. Informed consent was taken from the parents participating in the study. Pediatric residents asked the parents in detail about their children's sleep patterns and habits using a basic screening questionnaire. Parents who reported sleep problems in their children were asked a more detailed questionnaire (Paediatric Sleep questionnaire-PSQ by Chervin et al.) on their children's sleep patterns and habits [3]. The questionnaire aimed to identify sleep problems in detail and the associated co-morbidities.

III. Results

The following results were obtained from our study.

Demographics: of the 2235 children studied, 673 (30.1 %) had sleep problems out of which 364 (54%) were boys, and 309 (46%) were girls. The percentage of children with sleep problems increased with age. Sleep problems were reported in 19.8 % of toddlers, 31.7% of preschool children, 32.9% of school-age children, and 35.8% of teenagers. There is a significant difference between the incidence of sleep problems in children from urban households (n=509 children; 75.6%) and rural households (n=164 children; 24.4%). The following details concern the 673 children with sleep problems.

Sleep habits and timings: We asked the parents about the bedtime and wake-up time and calculated the total sleep time (TST). The mean bedtime was 22.02 hours on weekdays and 22.14 hours on weekends. The average wake-up time was 7.19 hours on weekdays and 7.33 hours on weekends. Children with sleep problems slept and woke up later than the entire study population. The average sleep duration of children with sleep problems was 9.95 hours on weekdays and 10.06 hours on weekends. This duration was less than the average sleep duration of the entire study group on weekdays (10.17 hours) and weekends (10.36 hours) respectively.

We asked the parents if they felt their children were getting adequate sleep. The American Academy of Sleep Medicine recommends that children get the following amounts of sleep on a regular basis to promote optimal health, daytime alertness, and school performance:

- Infants 4 months to 12 months should sleep 12 to 16 hours per 24 hours (including naps).
- Children 1 to 2 years of age should sleep 11 to 14 hours per 24 hours (including naps).
- Children 3 to 5 years of age should sleep 10 to 13 hours per 24 hours (including naps).
- Children 6 to 12 years of age should sleep 9 to 12 hours per 24 hours.

We also compared the actual sleeping hours with the American Association of Sleep Medicine (AASM) recommendations (table 1). Although 86.5% of parents of children with sleep problems perceived sleep adequacy in their children, only 71.9% of children with sleep problems are actually getting adequate sleep as per the AASM recommendations [4]. The percentage of children not getting adequate sleep increases with age ranging from 18.5% in toddlers to 44.3% in teenagers. Thus, the study shows a significant difference between what the parents perceive as adequate sleep and the AASM recommendations.

Age Group	**% Of parents perceive adequate sleep (Entire study population)**	**% Of children getting adequate sleep as per AASM recommendation (Entire study population)**	**% Of parents perceive adequate sleep (Children with sleep problems)**	**% Of children getting adequate sleep as per AASM recommendation (Children with sleep problems)**
Toddlers	445(95.9%)	348(75%)	81 (88.0%)	75 (81.5%)
Pre-School	582(95.7%)	501(82.4%)	175 (90.6%)	151 (78.2%)
School Age	934(94.1%)	838(84.3%)	273 (83.5%)	224 (68.5%)
Teenagers	161(94.7%)	138(81.2%)	53(86.9%)	34 (55.7%)
All children	2122 (94.9 %)	1825 (81.6%)	582 (86.5%)	484 (71.9%)

Table no 1: Comparison of sleep adequacy-parental perception versus AASM recommendations

We asked the parents if their kids had a bedtime routine. A regular bedtime routine is an essential component of sleep hygiene. Unfortunately, more than half of children (61.4%) with sleep problems did not have a regular sleep routine (table 2). We asked the parents of children with sleep problems if the COVID pandemic affected their bedtime routine. The pandemic has affected the bedtime routine in 14.6% of children ranging from 1.1% in toddlers to 21.3% in teenagers.

Age Group	Regular bedtime routine	No bedtime routine	Bedtime routine altered by COVID	Bedtime routine unaltered by COVID
Toddlers (n=92)	34 (36.9%)	58 (63.1%)	1 (1.1%)	91 (98.9%)
Pre-School (n=193)	71(36.7%)	122 (63.3%)	14 (7.2%)	179 (92.8%)
School Age (n=327)	136 (41.6%)	191 (58.4%)	70 (21.4%)	257 (78.6%)
Teenagers (n=61)	19 (31.1%)	42 (68.9%)	13 (21.3%)	48 (78.7%)
All children (n=673)	260 (38.6%)	413 (61.4%)	98 (14.6%)	575 (85.4%)

Table no 2: Bedtime Routine in children with Sleep Problems

We asked the parents if their kids slept in their own beds at night. Of the 673 children with sleep problems, most (67%) share the bed with their family members. The percentage of children who share a bed with parents decreases with age, but the percentage of children who share a bed with a sibling increases with age.

Sleep problems: We asked parents about any behavioural issues at bedtime. The following behavioural problems were noted- difficulty going to bed (21%), needing one of the parents to sleep (34.9%), moving the bed at night (6.5%), fear of sleeping in the dark (23.9%), waking up several times at night (30.1%).

The common parasomnias reported are bruxism (24.3%), sleep talking (7.1%), restless sleep (5.1%), nightmares (4.8%), and bedwetting (4.3%).

The commonly reported sleep-related breathing problems are mouth breathing (8.3%), snoring (6.7%), difficulty waking up in the morning (5.7%), feeling sleepy or unrefreshed after waking up (4.8%), and sleepiness during the day (3.5%). A small percentage have negative moods (1.5%) and headaches (1.3%) during the day. Out of 6.7% of children with snoring, 5.4 % had intermittent snoring during colds and respiratory illness, whereas 1.3% had persistent snoring. The overall summary of sleep problems in our study population is mentioned in Table 3.

Medical history: we asked for a detailed past history of any medical problems and associated co-morbidities. The commonly seen medical problems include allergic rhinitis (8.6%), obesity (8.6%), asthma (6.3%), and GERD (1.4%). Behavioural problems were seen in 4%, learning difficulties in 2.6%, and ADHD in 1.2% of patients. Adenotonsillectomy was done in 1.8% of children for sleep-related breathing problems. A family history of sleep problems was seen in 1.8% of the children.

Personal history: Among the 673 children with sleep problems, 85.6% used electronic gadgets with a mean duration of 2.37 hours per day. Half of them used gadgets before sleep. Regular use of caffeinated drinks was seen in 28.6% of children.

Physical examination: a thorough physical examination was done especially looking at any upper airway problems that could potentially affect sleep. The common abnormal findings noted were enlarged inferior nasal turbinates (8.6%), enlarged tonsils (7.9%), adenoid facies (6.8%), and deviated nasal septum (4.3%).

Final Diagnosis: The common final diagnoses (table 3) across all age groups include mouth breathing (8.3%), bruxism (7.3%), sleep talking (7.1%), snoring (6.7%), restless sleep (5.1%), nightmares (4.8%), bed wetting (4.3%), delayed sleep-wake phase disorder (2.3%), behavioural insomnia (2.3%), sleep terrors (1.6%), nocturnal leg pains (1.6%) and confusional arousals (1%).

Sleep Problem	Number of patients	Prevalence in children with sleep problems	Prevalence in the entire study group
Mouth breathing	186	27.6%	8.3%
Bruxism	164	24.3%	7.3%
Sleep Talking	160	23.8	7.1%
Snoring	150	22.3%	6.7%
Restless sleep	114	16.9%	5.1%
Nightmares	107	15.9%	4.8%

Bed wetting	97	14.4%	4.3%
Behavioural Insomnia	51	7.5%	2.3%
Delayed Sleep-Wake Phase Disorder	51	7.5%	2.3%
Sleep Terrors	36	5.3%	1.6%
Nocturnal leg pains	36	5.3%	1.6%
Confusional Arousals	23	3.4%	1%
Abnormal leg movements	17	2.5%	0.7%
Excess sweating in sleep	15	2.2%	0.7%
Sleep Walking	7	1.0%	0.3%
Nocturnal Cramps	5	0.7%	0.2%
Obstructive Sleep Apnea	5	0.7%	0.2%

Table 3: Prevalence of various sleep problems in our study group

IV. DISCUSSION

Our study is the largest epidemiological study on sleep problems and habits in the Indian subcontinent.

Sleep timings and habits: the typical bedtime was between 10 pm and midnight. The typical wake-up time was between 6 am to 8 am. The study shows a significant difference between what the parents perceive as adequate sleep and the AASM recommendations. Indian children seem to be sleeping later compared to their Western counterparts [5]. A significant percentage of children (28.1%) with sleep problems are not getting enough sleep. This sleep deprivation is seen especially in teenagers, where 44.3% of children seem to be getting inadequate sleep.

A regular bedtime routine is essential to sleep hygiene. Studies have shown that bedtime routine during the pre-bedtime period (one to two hours) leading to sleep impacts children's sleep [6]. Unfortunately, over half of the children with sleep problems had no sleep routine. The pandemic seems to have affected the bedtime routine of older children (over 6 years of age) compared to younger children. Across all age groups, one-third of children sleep on their own beds, whereas two-thirds share the bed with their parents or siblings. A study on cross-cultural differences in sleep in preschool children by Mindel et al [5] revealed that bed-sharing, and room sharing are common in Asian countries when compared to Caucasian countries.

Sleep problems: Our study has shown that sleep problems increased with age, with twice the number of teenagers affected compared to toddlers. Similar findings were revealed in a systematic review in China by Chen et al [7]. A significant percentage of children seem to be using electronic gadgets before sleep. Studies have shown that using electronic gadgets before sleep is associated with negative outcomes for sleep [8]. A significant percentage (28.6%) of children seem to be taking caffeinated drinks during the day. Studies have shown that excessive caffeine consumption can cause adverse health consequences such as psychomotor agitation, insomnia, headaches, and other problems [9]. The common final diagnoses across all age groups include mouth breathing, bruxism, sleep talking, snoring, restless sleep, nightmares, bed wetting, delayed sleep-wake phase disorder, behavioural insomnia, night terrors, nocturnal leg pains, and confusional arousals. Behavioural insomnia was a common problem in toddlers. Bedwetting is common in preschool and school-age children, whereas delayed sleep-wake phase disorder is common in teenagers. A systematic review and meta-analysis of sleep studies in China by Chen et al [7] revealed an overall prevalence of 37.6%, with common problems being snoring, restless sleep, mouth breathing, hyperhidrosis, bruxism, nightmares, and enuresis. Their study also showed that sleep problems increase with increasing age.

The limitation of the study is that it is completely based on parental perception. Further studies looking at sleep problems using objective tools like polysomnography are needed to establish the severity of various sleep problems in India.

V. Conclusion

The study showed that sleep problems exist in a significant proportion of the children studied. The study also highlighted that a significant percentage of Indian children are sleep deprived. Hence, there is a need for parental education about sleep problems and hygiene in children.

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