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A study of sleep problems and effect of COVID pandemic on sleep patterns in children and adolescents attending a tertiary care centre in Southern India

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ABSTRACT

Introduction: Children and teenagers who have difficulty sleeping have considerable mental and physical health issues. The present study aided to assess the prevalence of sleep disorders in children and adolescents. It would help create awareness amongst parents with children and adolescents with sleep problems. The need for health care professionals to study the sleep pattern among Indian children and adolescents would be assessed. *Methods:* This is cross sectional study was carried out amongst 299 children and adolescents between ages 1 and 18 attending the outpatient and inpatient department. Total 24 months were utilized for the study. Children and adolescents with serious and/or terminal illness were excluded. *Results:* The prevalence of sleep problems in this study was found to be 15.1% (45) from the 299 participants. From the total of 45 children with sleep problems, 78% (35) were school going children (5-12 years) and 20% (9) were teenagers (12-18 years). Pre-school children (3-5 years) constituted 2% (1). The sleep pattern was altered by the COVID pandemic in 43% (15) of school age children and 66.7% (6) of teenagers. The pandemic had affected older children (over 5 years of age). *Conclusion:* Two thirds of parents reported being unaware of their children's sleep issues. It was shown that sleep disturbances had a considerable detrimental influence on daytime functioning, including daily tiredness and suboptimal academic performance. The pandemic of COVID-19 disrupted sleep patterns by causing people to sleep more than required primarily school-age children and adolescents.

Keywords: Prevalence, sleep disorders, children, adolescents, Insomnia, Parasomnias, Bruxism, COVID-19.

1. INTRODUCTION

The biological process of sleep is crucial for a healthy and survival. It affects systemic physiology, metabolism, immune system, hunger management, hormonal and cardiovascular system function in addition to playing a crucial

part in brain function. A healthy lifestyle requires getting enough sleep at the right intervals without any sleep interruptions. Overall sleep quality is influenced by factors like sleep length, sleep quality, timing and regularity of sleep as well as the absence of sleep disorders or disruptions. Inadequate levels of both sleep quantity and quality are referred to as sleep disorders. Sleep disorders are any conditions that interfere with uninterrupted sleep (Hosokawa et al., 2022; Qanaq & Noorwali, 2023; Qahwaji, 2023).

Sleep is seen as a crucial component of the healing process and is necessary for survival on many levels, including the neurological, emotional and physical. Lack of sleep can affect growth, muscular development and tissue healing in children because HGH (human growth hormone) is released while they sleep. Lack of sleep has a variety of immediate and long-term repercussions on a person's life. Long-term effects include higher morbidity and mortality from car accidents, obesity, memory loss, coronary artery disease, hypertension, heart failure, stroke, type-2 diabetes, depression and impaired immune function. The short-term effects include a lack of attention and concentration, low productivity, reduced quality of life and an increase in absences from school or work (Chokroverty, 2010).

Children and adolescents who struggle with sleep experience worrisome medical and psychological conditions. Arrhythmia, left ventricular hypertrophy, cardiac pulmonary syndrome, growth failure, heart failure and death are all potential outcomes of severe sleep breathing disorders. Depression, cognitive difficulties, attention deficit and hyperactivity disorder, learning challenges and emotional instability can all be caused by sleep deprivation and other sleep disorders (Kim et al., 2017). As per Meltzer et al., (2010), the prevalence of sleep-related disorders in children and adolescents was reported to be roughly 43%, the frequency of snoring was determined to be 5% to 27%, the rate of insomnia was reported to be 5% to 20%, the rate of parasomnias was found to be 14% to 37% and the rate of obstructive sleep apnea was found to be 1% to 3%.

Additionally, it appears that kids underreport their sleep issues and primary healthcare providers and other caregivers under-diagnose them as a result. The effects of inadequate sleep on health and weight status are also poorly understood by many students and their families, as are the characteristics of good or bad sleep habits. This misperception is partially brought on by a lack of knowledge regarding the "normal or optimal" amount of sleep for children and teenagers (Olds et al., 2010).

Inspite of the rising prevalence and ill effects of lack of sufficient sleep, there is a paucity of literature on sleep habits and sleep hygiene among school going children and adolescents in India (Barathy et al., 2017; Bharti et al., 2006; Gupta et al., 2008; Ravikiran et al., 2011). Sleep deprivation, therefore, is a vital health issue to be looked into. Hence, we initiated this study using sleep questionnaires to examine the prevalence of sleep disorders in Indian children and adolescents. These questionnaires were employed to overcome the practical difficulties in asking patients about sleep problems in an outpatient &/ inpatient setting.

2. MATERIALS AND METHODS

Study Design

Cross sectional observational study.

Place of study

Outpatient (OPD) and inpatient (IPD) departments of a Tertiary health care institute.

Duration

Total 24 months period from November 2020 to November 2022 after the approval of scientific and ethics committee.

Sample size

According to study of literature the prevalence of sleep disorder was found to be 42.7%. With 6% acceptable difference at 95% confidence level, the sample size comes up to 262 (Statistical package used-WinPepi version 11.65). Hence a sample size of 290-300 was calculated for this study.

Inclusion criteria

Children and adolescents from age 1 to 18 years visiting the Tertiary Health Care Institute. Children and adolescents with chronic illnesses also will be enrolled like Asthma, Cystic Fibrosis, Attention deficit/Hyperactivity Disorder, Congenital heart disease, Epilepsy disorder, Diabetes mellitus etc.

Exclusion criteria

Children less than one year of age and above 18 years of age. Children and adolescents admitted in ICU.

Methodology

Children and adolescents between 1 to 18 years were enrolled in the study after the written informed consent of parents and assent of adolescents (9-12 years of age)

Parents and adolescents were given a primary sleep questionnaire and asked about sleep habits by the investigator. If any sleep problems were suspected based on the answers given; children, adolescents and their parents were followed up by the investigator with a detailed secondary sleep questionnaire.

The benefits of participating in this study were getting an understanding of the sleep problems in children and adolescents. In addition, awareness amongst parents about sleep problems in their children were assessed and conveyed. Any concerns and doubts they had regarding the study were answered before their consent and/or assent to participate in the study.

3. RESULTS

Total 3.7% pre-school children, 14.9% school age (5-12 years) children and 24.3% teenagers were found to have sleep problems, but the presence of sleep problems in any particular age group was not statistically significant (Table 1). No sleep problems were reported in toddlers (p=0.074). Considerably more (74.3%) school aged children (5-12 years) are getting adequate sleep as compared to teenagers (33.3%) (Table 2). P value=0.052 (Not significant).

Table 1 Age Groups and Sleep Problems

Age groups	Total	Sleep problems	
		N	%
Pre-school (3-5 years)	27	1	3.7
School (5-12 years)	235	35	14.9
Teenagers (13-18 years)	37	9	24.3
Total	299	45	15.1

Table 2 Percentage of participants getting adequate sleep as per the AASM (American Academy of Sleep Medicine) recommendations

Age group	Total	Yes		No	
		N	%	N	%
Pre-school (3-5 years)	1	1	100	0	0
School (5-12 years)	35	26	74.3	9	25.7
Teenagers (13-18 years)	9	3	33.3	6	66.7

Table 3 Comparison of parental perception versus actually recommended sleep

Age group	Total	Parental perception of sleep inadequacy		Professional perception of sleep inadequacy	
		N	%	N	%
Pre-school (3-5 years)	1	1	100.0	1	100.0
School (5-12 years)	35	27	77.1	33	94.3
Teenagers (13-18 years)	9	7	77.8	9	100.0

In all the age groups, parents are in the misconception that their children are getting adequate sleep, with the maximum misconception (77.8%) being in the adolescents (Table 3). Chi square test P value=0.985. Teenagers sleep pattern was more affected by COVID pandemic as compared to school-aged children (5-12 years) (66.7 % vs. 42.9 %) (Table 4).

Table 4 Percentage of participants whose sleep pattern was altered by the COVID pandemic

Age group	Total	Yes		No	
		N	%	N	%
Pre-school (3-5 years)	1	0	0	1	100
School (5-12 years)	35	15	42.9	20	57.1
Teenagers (13-18 years)	9	6	66.7	3	33.3

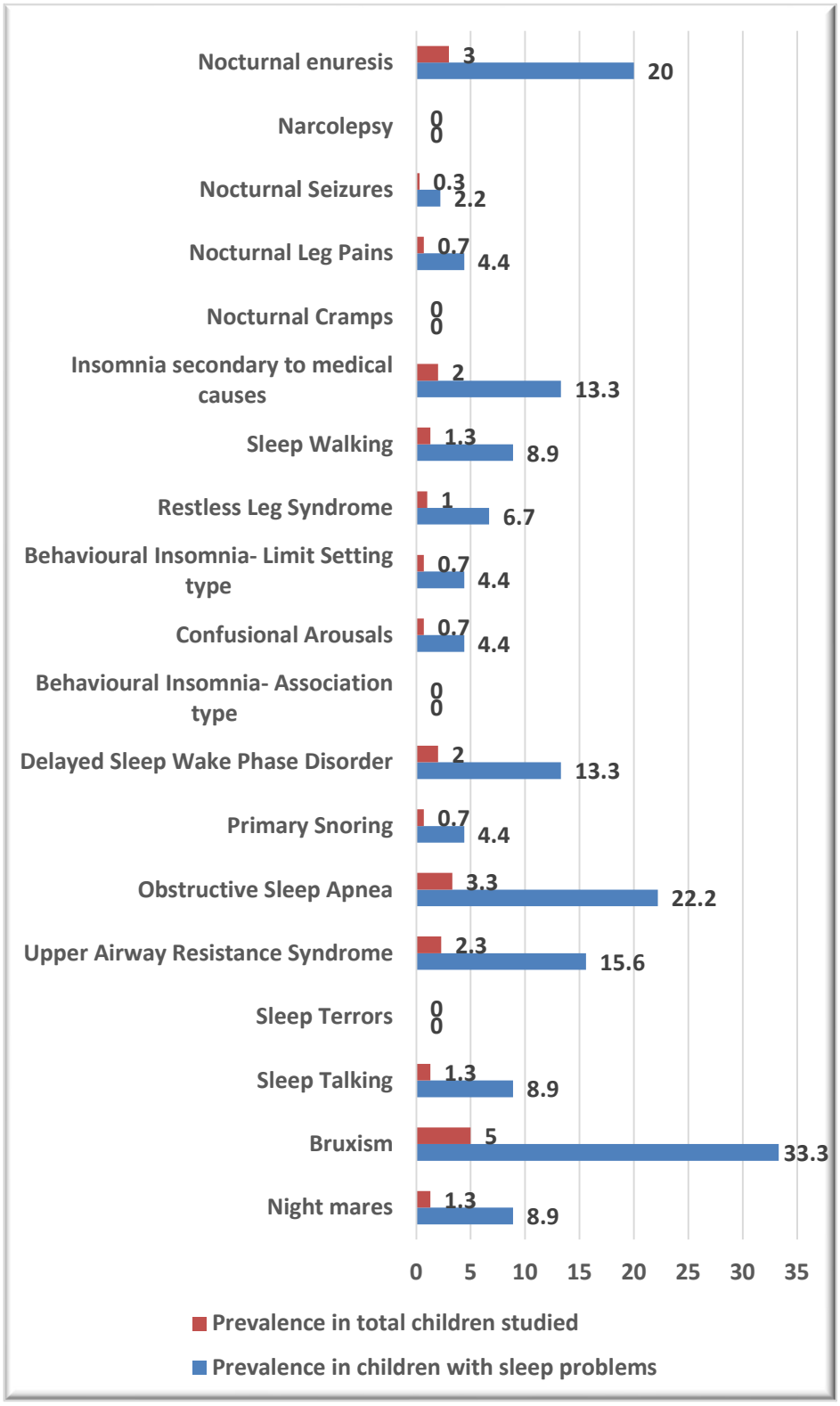
Table 5 Final Diagnosis

Final diagnosis	Prevalence in children with sleep problems		Prevalence in total children studied
	Number	Percentage	
Night mares	4	8.9	1.3
Bruxism	15	33.3	5.0
Sleep Talking	4	8.9	1.3
Sleep Terrors	0	0.0	0.0
Upper Airway Resistance Syndrome	7	15.6	2.3
Obstructive Sleep Apnea	10	22.2	3.3
Primary Snoring	2	4.4	0.7
Delayed Sleep Wake Phase Disorder	6	13.3	2.0
Behavioural Insomnia- Association type	0	0.0	0.0
Confusional Arousals	2	4.4	0.7
Behavioural Insomnia- Limit Setting type	2	4.4	0.7
Restless Leg Syndrome	3	6.7	1.0
Sleep Walking	4	8.9	1.3
Insomnia secondary to medical causes	6	13.3	2.0
Nocturnal Cramps	0	0.0	0.0
Nocturnal Leg Pains	2	4.4	0.7
Nocturnal Seizures	1	2.2	0.3
Narcolepsy	0	0.0	0.0
Nocturnal enuresis	9	20.0	3.0

The final diagnosis was that 33.3% of children with sleep problems had bruxism, 22.2% had obstructive sleep apnea, 20% had nocturnal enuresis, 15.6% had upper airway resistance syndrome, 13.3% had delayed sleep wake phase disorder and insomnia secondary to medical causes, each (Table 5) (Graph 1).

Sleep walking and sleep talking was found in 8.9% children. Restless leg syndrome was seen in 6.7% children (Table 5) (Graph 1).

Remaining were primary snoring (4.4%), confusional arousals (4.4%), Behavioural Insomnia- Limit Setting type (4.4%) and nocturnal seizures (2.2%) (Table 5) (Graph 1).



Graph 1 Final Diagnosis

4. DISCUSSION

Prevalence of sleep problem

About 25% of all children experience sleep issues which can range from temporary issues with falling asleep and nocturnal waking to more serious primary sleep disorders like obstructive sleep apnea (Owens, 2008). 15.1% (45/299) of the children in this study experienced a sleep disturbance of some kind, ranging from accidental bedwetting to more serious conditions like OSA and sleep

deprivation. This is less in comparison to other studies of Thomas et al., (2021) and Bharti et al., (2006) who have reported the prevalence of sleep problems to be 59% and 42.7%, respectively. From the total of 45 children with sleep problems, 78% were school going children (5-12 years) and 20% were teenagers. Pre-school children constituted 2%.

Sleep problems were not reported in toddlers. 3.7% pre-school children, 14.9% school age children and 24.3% teenagers were found to have sleep problems in our study. Similarly, it was reported that sleep deprivation (32.2%) had a positive correlation with age ($p<0.001$) (Suri et al., 2008).

Adequate sleep

The parents were asked if they thought their children were getting adequate sleep or not. In this study, the actual sleeping hours were compared with the recommendation of the American Association of sleep medicine (AASM). (85) 77% of school age children's parents felt that their children are getting inadequate sleep. 77.8% of teenagers' parents felt that their children are getting inadequate sleep. But on comparing the parental perception of adequacy of sleep with the recommendation of AASM, 100% of pre-school children, 94.3% of school age children and 100% of adolescents are getting inadequate sleep.

So, in all the age groups, parents had the misconception that their children are getting adequate sleep, with the maximum difference between what parents thought and the recommended sleep being in the adolescents. However, the difference was not statistically significant. Gibson et al., (2006) observed that seventy percent of the students had less than 8.5 hours weeknight sleep. Mishra et al., (2017) also reported that the sleep durations reported in their study were lower than recommended sleep duration for children.

COVID pandemic

The sleep pattern was altered by the COVID pandemic in 43% of school age children and 66.7% of teenagers. The pandemic seems to have affected older children (over 5 years of age). The sleep- patterns of pre-school children were unaffected by the COVID pandemic. The cumulative prevalence of any sleep disturbance in children during the pandemic was 54% (95% CI: 50-57%) (Sharma et al., 2021). Although SARS-CoV-2 infection is linked to an asymptomatic or moderate clinical course in children, the pandemic's indirect consequences, such as lockdowns, travel restrictions and the closure of schools and recreational activities, have had an impact on children's movement and lifestyle choices (Castagnoli et al., 2020; Mustafa and Selim, 2020).

Awareness of child's sleep problems

The parents were asked if they were aware of sleep problems occurring in children. 96.3% of pre-school parents, 85.6% of school-age parents and 75.7% of teenagers' parents reported that they were unaware of their children's sleep problems. Of the parents who were aware of sleep difficulties with their children, 6% observed that their children were sleepy during daytime, 5.4% parents complained of mouth breathing during sleep, 5% parents complained of snoring during sleep. Grinding of teeth during sleep (bruxism) (4%), difficulty going to sleep at night (3.7%), feels restless and moves a lot during sleep (4.3%), Gasping, breath holding, or pauses in breathing during sleep (3%) were some other problems observed.

Final diagnosis

In this study, the final diagnosis was that 33.3% of children with sleep problems had bruxism, 22.2% had obstructive sleep apnea, 20% had nocturnal enuresis, 15.6% had upper airway resistance syndrome, 13.3% had delayed sleep wake phase disorder and insomnia secondary to medical causes, each. Somnambulism (sleep walking) and somniloquy (sleep talking) was found in 8.9% children. Restless leg syndrome was seen in 6.7% children. Primary snoring, confusional arousals, behavioural insomnia-limit setting type and nocturnal leg pains were seen in 4.4% children, each. 2.2% children had nocturnal seizures. In this study, bruxism (teeth grinding) was reported in 5% of the entire population, but was a major finding (33.3%) among the children with sleep problems. Bharti et al., (2006) reported bruxism in 11.6% children and Kim et al., (2017) in 21% children.

In this study night bedwetting was seen in 3% of the entire subjects and in 20% of the children with sleep problems. A couple of studies reported nocturnal enuresis (night wetting) in 7- 18% of children (Bharti et al., 2006; Owens, 2008). A child has primary sleep enuresis if they have never experienced prolonged nocturnal continence and secondary sleep enuresis if they start wetting after a year of continence. At age 6, it affects 25% of males and 15% of girls and by age 12, it has regressed to 8% and 4% respectively (Suri et al., 2008). In this study, 3.3% of the entire population and 22.2% of children with sleep problems were found to have Obstructive sleep apnea (OSA). The pharyngeal airway repeatedly narrowing or collapsing while you sleep is a symptom of obstructive sleep apnea (OSA).

5. CONCLUSION

The prevalence of sleep problems in this study was 15.1% amongst 1 to 18 years of age group; majority of them did not have a sleep routine. A considerable number of parents (two thirds) were not aware of sleep problems in their children. The negative impact of sleep disorders on daytime functioning like daytime sleepiness and poor academic performance was found to be significant. The COVID pandemic had disturbed the sleep patterns by increasing total sleep time than recommended, especially in school going children and teenagers. Predominance of bruxism was found amongst participants with sleep problems followed by obstructive sleep apnea, nocturnal enuresis and upper airway resistance syndrome like adenoid enlargement.

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Ethical approval

The study was approved by the Institutional Ethics Committee of Dr DY Patil Vidyapeeth University, Pune, Maharashtra. (Reference number I.E.S.C./121/2022).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

1. Barathy C, Prabha S, Shanthi A, Devikittu. Study of sleep pattern in children aged 1-12 years attending OPD at tertiary care hospital, Puducherry, India. Int J Contemp Pediatr 2017; 4(6):1980-85.
2. Bharti B, Malhi P, Kashyap S. Patterns and Problems of Sleep in School Going Children. Indian Pediatr 2006; 43(1):35-8.
3. Castagnoli R, Votto M, Licari A, Brambilla I, Bruno R, Perlini S, Rovida F, Baldanti F, Marseglia GL. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in children and adolescents: A systematic review. JAMA Pediatr 2020; 174(9):882-889. doi: 10.1001/jamapediatrics.2020.1467
4. Chokroverty S. Overview of sleep & sleep disorders. Indian J Med Res 2010; 131:126-40.
5. Gibson E, Powles P, Thabane L, O'Brien S, Molnar D, Trajanovic N, Ogilvie R, Shapiro CM, Yan M, Chilcott-Tanser L. "Sleepiness" is serious in adolescence: Two surveys of 3235 Canadian students. BMC Public Health 2006; 6(116).
6. Gupta R, Bhatia M, Chhabra V, Sharma S, Dahiya D, Semalti K, Sapra R, Dua RS. Sleep Patterns of Urban School-going Adolescents. Indian Pediatr 2008; 45(3):183-194.
7. Hosokawa R, Tomozawa R, Fujimoto M, Anzai S, Sato M, Tazoe H, Katsura T. Association between sleep habits and behavioral problems in early adolescence: A descriptive study. BMC Psychol 2022; 10(1):254.
8. Kim D, Lee C, Ahn Y. Sleep problems in children and adolescents at pediatric clinics. Korean J Pediatr 2017; 60(5):158-65.
9. Meltzer L, Johnson C, Crosette J, Ramos M, Mindell J. Prevalence of Diagnosed Sleep Disorders in Pediatric Primary Care Practices. Pediatrics 2010; 125(6):e1410-e1418.
10. Mishra A, Pandey R, Minz A, Arora V. Sleeping habits among school children and their effects on sleep pattern. J Caring Sci 2017; 6(4):315-23.
11. Mustafa N, Selim L. Characterisation of COVID-19 pandemic in paediatric age group: A systematic review and meta-analysis. J Clin Virol 2020; 128:104395.

12. Olds T, Maher C, Blunden S, Matricciani L. Normative Data on the Sleep Habits of Australian Children and Adolescents. Sleep 2010; 33(10):1381-8.
13. Owens J. Classification and epidemiology of childhood sleep disorders. Prim Care 2008; 35(3):533-46.
14. Qahwaji DM. Lifestyle behaviours, dietary habits, physical activity and biochemical measurements in Saudi University students. Med Sci 2023; 27: e198ms2940. doi: 10.54905/disssi/v27i134/e198ms2940
15. Qanaq R, Noorwali E. The relationship between sleep quality and dietary intake among pregnant women in Saudi Arabia. Med Sci 2023; 27: e163ms2899. doi: 10.54905/disssi/v27i133/e163ms2899
16. Ravikiran S, Jagadeeshkumar P, Latha K. Sleep Problems in Preschool and School Aged Rural Indian Children. Indian Pediatr 2011; 48(3):221-3.
17. Sharma M, Aggarwal S, Madaan P, Saini L, Butani M. Impact of COVID-19 pandemic on sleep in children and adolescents: A systematic review and meta-analysis. Sleep Med 2021; 84:259-267.
18. Suri J, Sen M, Adhikari T. Epidemiology of Sleep Disorders in School Children of Delhi: A Questionnaire Based Study. Indian J Sleep Med 2008; 3(2):42-50.
19. Thomas A, Prasad V, Jayakumar C. Sleep disorders in adolescent school children in Kochi: A cross sectional study. Int J Contemp Pediatr 2021; 8(6):1079-84.