International Journal of Contemporary Pediatrics
Thomas AA et al. Int J Contemp Pediatr. 2021 Jun;8(6):1079-1084
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20212052

Original Research Article

Sleep disorders in adolescent school children in Kochi: a cross sectional study

Anupa Achamma Thomas, Vinitha Prasad*, C. Jayakumar

Department of Pediatrics, Amrita Institute of Medical Sciences, Kochi, Kerala, India

Received: 01 April 2021
Revised: 10 May 2021
Accepted: 13 May 2021

***Correspondence:**
Dr. Vinitha Prasad,
E-mail: drviniraj@gmail.com

ABSTRACT

Background: Sleep disorders in children are often undiagnosed and can negatively impact their physical and psychological health. This study was done to estimate the prevalence of sleep disorders in adolescent school children and to examine the association between body mass index and sleep disorders.
Methods: This cross-sectional study was conducted in 3 purposively selected schools in Kochi among children aged 13-17 years. Pediatric sleep questionnaire was distributed among 550 students of which 229 were received back. Weight and height of the children were recorded and the BMI was calculated. Data were analysed using SPSS, version 20, and Chi-square was done to determine association.
Results: The mean age of the study population was 14.56±1.311 years with equal gender distribution. 59% had sleep disorders. Parasomnia was the most common (64%) sleep disorder. Sleep talking (36%) was the most common parasomnia. Out of the total 229 children, 60 had Excessive daytime sleepiness (26.3%). 18.4% had sleep related breathing disorder, 4.37% had insomnia, 5.3% had restless legs. Delayed sleep phase disorder was seen in 13 (5.7%) of the total 229 children. BMI below 5th percentile was significantly associated with insomnia. We did not find any significant association between BMI and other categories of sleep disorders.
Conclusions: There is a high prevalence of sleep disorders among adolescent school children. Underweight in adolescents was associated with insomnia. There is a need for greater awareness of sleep disorders in children among parents and health care professionals.

Keywords: Sleep disorders, Adolescent school children, Body mass index

INTRODUCTION

Sleep disorders are common in adolescents but are often under recognized and their implications are often neglected. About a fifth of children and adolescents have sleep disorders of diverse aetiology which can disrupt their quality of life.[1] Sleep deprivation in Adolescents can have negative outcomes like poor academic performance, mood and behaviour changes, substance abuse and accidents. Studies on sleep patterns in school going adolescents from Delhi, India showed higher incidence of daytime sleepiness and sleep deprivation in adolescents and its deleterious effects on academic performance and their self-esteem.[2]

In another study of Indian school-going children residing in Delhi, 47.5% of the children were observed to suffer from some form of sleep disorder.[3] Current recommendations suggest 8 to 10 hours of sleep per night for adolescents. 4 77.9% of students in a recent Youth risk behaviour survey from the CDC indicated that Adolescents get less than 8 hours of sleep on school nights.5 Awareness about the sleep disorders prevalent in Adolescents can equip paediatricians and parents to take

remedial measures to avoid the adverse physical and psychological consequences of sleep deprivation.

This study was undertaken to investigate the occurrence of sleep disorders in adolescent school children and to examine the association between BMI and sleep disorders in adolescents.

Objectives

The objectives of our study were to estimate the prevalence of sleep disorders in adolescent school children and to determine the association between body mass index and sleep disorders in adolescents.

METHODS

This was a cross-sectional study conducted by Amrita Institute of Medical Sciences, Kochi a tertiary care teaching hospital in Kerala from June 2019 to March 2020. The inclusion criteria were Adolescent school children studying in 8th to 12th classes aged 13-17 years and parental ability to read and write English. Children with acute and chronic illnesses, those with craniofacial abnormalities and children who are staying away from home and parents were excluded from the study. Approval was obtained from the Institutional Ethics Committee and permission was taken from school authorities to conduct the study. The Paediatric sleep questionnaire was distributed among the students and they were given one weeks' time to return the filled-up questionnaire.

The Paediatric Sleep Questionnaire (PSQ) (Chevrin et al 2000) is a parent completed questionnaire, used widely in paediatric sleep research. The instrument contains about 70 closed question items with response options of "yes," "no," or "don't know."

Validity data have been published for two of its subcomponents: The Sleep related breathing disorder scale (SRBD scale) which includes the snoring and sleepiness subscales and the Periodic leg movement/restless legs syndrome scale. Other parts of the PSQ have also been used in published research.6 SRBD scale has sensitivity of 0.85 and specificity of 0.87 for identifying Sleep related breathing disorders in children 2-18 years of age.

The SRBD scale has 22 questions divided into 3 domains, snoring, sleepiness and behaviour (Appendix 1). Answers are assigned a score of 1 for yes and 0 for no. The SRBD score was calculated for each participant by dividing the total number of positive answers by the total number of "Yes" and "No" answers. The cutoff score was 0.33. Domain scores were calculated similarly, using only items within the specific domain.

Items 1-4 of the SRBD scale is the snoring subscale where the overall score is obtained by dividing the total no of positive responses by the total no of yes or no responses.

Excessive daytime sleepiness was identified using the Sleepiness Subscale (PSQ-SS) which has four questions. The items asked about feeling unrefreshed in the morning, being hard to wake up in the morning, a problem with daytime sleepiness, and sleepiness observed by a teacher.

The PLMS/RLS subscale of PSQ has 6 questions. (Appendix 2). The PLMS score varies from 0.0 to 1.0 and is calculated as the proportion of symptoms that are present, with double weight assigned to the two most specific symptoms, those of restless legs and growing pains worst in bed.

PLMS scale score >0.33 showed a sensitivity of 0.79 and a specificity of 0.56 for five or more PLMS per hour of sleep.[7]

4 questions in the PSQ were used to screen children for Insomnia. (Difficulty in falling asleep at night, Waking more than twice on average. Trouble falling back to sleep and Waking in the morning feeling unrefreshed). Subjects were considered to have insomnia if answers were positive for at least 2 of the above questions.[8]

The following questions were asked to detect Delayed sleep phase syndrome (DSPS):

Does your child have difficulty in falling asleep at night

Does the time at which your child goes to bed change a lot from day to day?

Does the time at which your child gets up from bed change a lot from day to day?

Children who fulfilled all the 3 criteria were taken as having symptoms suggestive of delayed sleep phase disorder.

550 questionnaires were distributed among students, along with a letter explaining to the parents the purpose of the study and an informed consent form. 229 completed questionnaires were received back. At the time of collection of the questionnaires, the weight and height of the student were recorded and BMI was calculated as weight (kg) divided by squared height (m2) and plotted on the IAP BMI growth chart. The BMI was then split into 3 categories: underweight, normal weight, overweight + obese.

The data was compiled and entered in the Microsoft excel sheet. It was analyzed using statistical software IBM Statistical package for social science (SPSS) (CHICAGO) version 20. Mean and standard deviation was calculated for all continuous/quantitative variables. To obtain the association of categorical variables, chi

square test was applied. A p≤0.05 was considered as statistically significant.

RESULTS

Our study sample had 229 children, with 115 females and 114 males. 167 (72.9%) children were aged between 13-15 years, while 62 (27.1%) children were between 16-18 years. Mean age of the sample was 14.56 (±1.311) years.

Table 1: Distribution of age.

Age (in years)	Frequency (n=229)	Percentage
13-15	167	72.9
16-18	62	27.1

Table 2: Distribution of BMI.

BMI	Frequency (n=229)	Percentage
Normal	157	68.6
Overweight+Obese	32	14
Underweight	40	17.5

157 students, representing 68.6% of the study population had normal BMI. 32 (14%) were overweight+obese and 40 (17.5%) were underweight as per the IAP 2015 BMI chart.

The overall prevalence of sleep disorder in our study population was 59%. 135 students out of the 229 participants had a sleep disorder.

The frequency of each sleep disorder (classified as per ICSD-3) is shown in the Table 3.

Parasomnia was the most common sleep disorder (64%) in our study. Sleep talking was the most common parasomnia with a prevalence of 36%. 19.3% had nightmares and 6.6% of children had night terrors. 2.2% reported having sleep walking. 3.5% of the children had sleep bruxism.

Table 3: Frequency of sleep disorders.

Sleep disorder	Frequency
Insomnia	10 (4.4%)
Sleep related breathing disorder	42 (18.3%)
Excessive daytime sleepiness	41 (17.9%)
Delayed sleep phase disorder	13 (5.7%)
Parasomnias	146 (64.1%)
Sleep talking	82 (36%)
Sleep walking	5 (2.2%)
Nightmare	44 (19.3%)
Night terror	15 (6.6%)
Bruxism	8 (3.5%)
Restless leg syndrome	45(19.7%)

Association between BMI and sleep disorders

Table 4 shows the association between BMI and each category of sleep disorder.

Underweight adolescents showed a strong association with insomnia (p=0.021). No statistically significant association was found between BMI and the other types of sleep disorders.

Table 4: Association between BMI and each category of sleep disorder.

Sleep disorder		BMI			
		Underweight (N=40)	**Normal (N=157)**	**Overweight/obese (N=32)**	**P value**
Insomnia	No	35 (87.5%)	153 (97.5%)	31 (96.9%)	0.021
	Yes	5 (12.5%)	4 (2.5%)	1 (3.1%)	
SRBD	No	33 (82.5%)	127 (80.9%)	27 (84.4%)	0.888
	Yes	7 (17.5%)	30 (19.1%)	5 (15.6%)	
Excessive daytime sleepiness	No	31 (77.5%)	129 (82.2%)	28 (87.5%)	0.546
	Yes	9 (22.5%)	28 (17.8%)	4 (12.5%)	
Delayed sleep phase disorder	No	37 (92.5%)	149 (94.9%)	30 (93.8%)	0.091
	Yes	3 (7.5%)	8 (5.1%)	2 (6.3%)	
Parasomnias	No	14 (35%)	51 (32.4%)	18 (56.2%)	0.959
	Yes	26 (65%)	106 (67.5%)	14 (43.7%)	
Restless leg syndrome	No	27 (67.5%)	131 (83.4%)	184 (80.3%)	0.076
	Yes	13 (32.5%)	26 (16.6%)	45 (19.7%)	

DISCUSSION

A total 59% of the children in the present study had some form of sleep disorder. Researchers have reported prevalence of sleep problems in children and adolescents ranging from 20-70%.[9] Parasomnias are often reported more frequently in young children and they tend to remit in adolescence. But in our study parasomnia was the most

common sleep disorder. 146 out of 229 adolescents (64%) had a parasomnia

Sleep talking was reported in 36% of adolescents in the present study. The prevalence of nightmares was 19.3%, night terrors was 6.6% and sleep walking was 2.2% in the current study. Sleep talking was found to be the most frequent parasomnia (45.4%) among adolescents in a study in Spain.[10] In the TuCASA study, prevalence rates of sleep talking, in a cohort of adolescents was relatively higher (9.4%) than the other parasomnias.[11] The prevalence of sleep walking was 1.4% in the TuCASA prospective cohort study.3 previous studies in adolescents have observed the prevalence rates of sleep walking to vary from 3 to 15%, 1%–7% for night terrors, 2%–18% for Eneuresis and 5%–27% for sleep talking. [12]

Insomnia was seen in 4.37% of our study population. Of the 229 children, 10 children (4.37%) had insomnia while 219 (95.63%) children did not have insomnia. In a study done in Cuenca Spain among adolescents school children, prevalence of Insomnia was found to be 9.9%.[10] Another study done on sleep disorders in adolescents in Chennai, India by Rene Jochebed showed that obstructive sleep apnoea and Insomnia were the common disorders among their study population.[13]

In our study, underweight in adolescents showed a strong association with insomnia compared to normal or overweight adolescents (p=0.021). A study among Norwegian adolescents by Sivertsen et al observed a strong U-shaped association between BMI categories and insomnia for girls, whereas the relationship was linear for boys.[14]

Sleep-related breathing disorders (SRBD) are a spectrum of disorders that range from mild snoring to severe obstructive sleep apnea. In our study, 18.3% had SRBD. The prevalence of snoring in our study was 7.9%. No statistically significant association was seen between BMI and SRBD in our study. Snoring was reported by 12.7% of school children by Suri et al. Previous studies have demonstrated that BMI was linearly associated with the prevalence of OSA symptoms.[14]

Parent reported excessive day time sleepiness was seen in 17.9% of our study population. Excessive daytime sleepiness was reported by 24% of children in a study done by Suri et al among school children in Delhi.

In a community-based school survey by Gupta et al wherein school going adolescents from 9th to 12th standard were included daytime sleepiness was reported by 52% of the 12th std students. Calhoun et al investigated the prevalence of excessive daytime sleepiness in a sample of school children and found a prevalence of 15% and a significant univariate relationship between BMI.[15]

A total 5.7% of children had Delayed sleep phase disorder. No significant association was found with BMI. In a previous study done in Australian adolescents, prevalence of Delayed sleep phase disorder was found to be 1.1%.[16] In a Swedish adolescent cohort study, prevalence of DSPD was 3.3%. Sivertsen et al estimated the prevalence of delayed sleep phase disorder among adolescents and found it to have a prevalence of 3.3% but no positive association was found between BMI and Delayed sleep phase disorder.

A total 19.7% of children in our study had periodic limb movement/restless legs syndrome. Baran et al has found that RLS is common in obese children.[17] We did not find any significant association with BMI. The prevalence of RLS was 5.1% in a study of 157 adolescents by Gianakki et al in Brazil and they were found to exhibit significantly higher body fat levels and poorer sleep quality.[18]

Limitations of the study

This was a questionnaire-based study and the sample size was small. But we used the PSQ which is validated for identifying SDB and RLS in both clinical and research settings.

CONCLUSION

The results of our study reveals that there is a high prevalence of sleep disorders among adolescent school children. This needs further research as poor sleep quality can affect physical and psychological development in this vulnerable age group.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kotagal S, Pianosi P. Sleep disorders in children and adolescents. BMJ. 2006;332:828.
2. Gupta R, Bhatia MS, Chhabra V, Sharma S, Dahiya D, Semalti K et al. Sleep patterns of urban school-going adolescents. Indian Pediatr. 2008;45(3):183-9.
3. Suri J C, Sen M K, Adhikari T. Epidemiology of sleep disorders in school Children of Delhi: A questionnaire based study. Indian J Sleep Med. 2008;3(2):42-50.
4. Paruthi S, Brooks LJ, D'Ambrosio C, et al. Recommended amount of sleep for pediatric populations: a consensus statement of the American Academy of Sleep Medicine. J Clin Sleep Med. 2016;12(6):785-6.
5. Centers for Disease Control and Prevention. [2019] Youth Risk Behavior Survey. http://www.cdc.gov/YRBSS. Accessed on 01 February 2021.

6. Chervin RD, Archbold KH, Dillon JE, Pituch KJ. Pediatric sleep questionnaire (PSQ): validity and reliability of scales for sleep-disordered breathing, snoring, sleepiness, and behavioral problems. Sleep Med. 2000;1(1): 21-32.
7. Chervin RD, Archbold KH, Dillon JE, Pituch KJ, Panahi P, Dahl RE et al. Associations Between Symptoms of Inattention, Hyperactivity, Restless Legs, and Periodic Leg Movements. Sleep. 2002;25(2):213-8.
8. Archbold KH, Pituch KJ, Panahi P, Chervin RD. Symptoms of sleep disturbances among children at two general pediatric clinics. J Pediatr. 2002;140(1):97-102.
9. Blackham A, McDaniel JR, Chauvin IA. Sleep Disruptions and Disorders in Children and Adolescents: A Review of the Impact of Parents and Family on Sleeping Behaviors. Ann Sleep Med. 2019;2(1):19-35.
10. García-Jiménez MA, Salcedo-Aguilar F, Rodríguez-Almonacid FM, Redondo-Martínez MP, Monterde-Aznar ML, Marcos-Navarro AI et al. The prevalence of sleep disorders among adolescents in Cuenca, Spain. Revista de Neuroligia. 2004;39(1):18-24.
11. Budhiraja R, Quan SF. Outcomes from the Tucson Children's Assessment of Sleep Apnea Study (TuCASA). Sleep Med Clin. 2009;4(1):9-18.
12. Furet O, Goodwin JL, Quan SF. Incidence and Remission of Parasomnias among Adolescent Children in the Tucson Children's Assessment of Sleep Apnea (TuCASA) Study. Southwest J Pulm Crit Care. 2011;2:93-101.
13. Rene Jochebed. S, Jothi Priya A. Common Sleep Disorders in Adolescents- A Survey. J Pharm Sci and Res. 2015;7(6):381-4.
14. Sivertsen B, Pallesen S, Sand L, Hysing M. Sleep and body mass index in adolescence: results from a large population-based study of Norwegian adolescents aged 16 to 19 years. BMC Pediatr. 2014;14:204.
15. Calhoun SL, Vgontzas AN, Fernandez-Mendoza J, Mayes SD, Tsaoussoglou M, Basta M, et al. Prevalence and risk factors of excessive daytime sleepiness in a community sample of young children: the role of obesity, asthma, anxiety/depression and sleep. Sleep. 2011;34(4):503-7.
16. Lovato N, Gradisar M, Short M, Dohnt H, Micic G. Delayed sleep phase disorder in an Australian school-based sample of adolescents. J Clin Sleep Med. 2013;9(9):939-44.
17. Baran RT, Atar M, Pirgon Ö, Filiz S, Filiz M. Restless Legs Syndrome and Poor Sleep Quality in Obese Children and Adolescents. J Clin Res Pediatr Endocrinol. 2018;10(2):131-8.
18. Giannaki CD, Hadjigeorgiou GM, Aphamis G, Pantzaris M, Sakkas GK. Restless legs syndrome in adolescents: relationship with sleep quality, cardiorespiratory fitness and body fat. Sleep Sci. 2017;10(1):7-10.

Cite this article as: Thomas AA, Prasad V, Jayakumar C. Sleep disorders in adolescent school children in Kochi: a cross sectional study. Int J Contemp Pediatr 2021;8:1079-84.

APPENDIX 1

Sleep related breathing disorder Scale

Please answer the following questions as they pertain to your child in the past month. Score = the total number of positive answers divided by the total number of "Yes" and "No" answers. The Cutoff score is 0.33.

While sleeping does your child…. Yes No Dont Know Snore more than half the time? **Always snore** **Snore loudly?** **Have "heavy" or "loud" breathing** **have trouble breathing or struggle to breathe?**
Have you ever seen your child stop breathing during the night?
Does your child: Tend to breathe through the mouth during the day? Have a dry mouth in the morning? Occasionally wet the bed?
Does your child Wake up feeling un-refreshed in the morning? Have a problem with sleepiness during the day?
Has a teacher/supervisor commented that your child appears sleepy during the day?
Is it hard to wake your child up in the morning?
Does your child wake up with headaches in the morning? Did your child stop growing at a normal rate at any time since birth?
Is your child overweight?
This child often: Does not seem to listen when spoken to directly Has difficulty organizing tasks and activities Is easily distracted by extraneous stimuli Fidgets with hands or feet or squirms in seat Is "on the go " or often acts as if "driven by a motor" Interrupts or intrudes on others (butts into conversations or games)

APPENDIX 2

The PLMS/RLS subscale of Pediatric sleep questionnaire

*** Does your child describe restlessness of the legs when in bed?**
* Does your child have growing pains that are worst in bed?
At night, does your child usually get out of bed (for any reason)?
Does your child wake up more than twice a night on average?
Does your child wake up feeling unrefreshed in the morning?
Does your child wake up with headaches in the morning?

* Double-weighted in calculation of PLMS Score.