A Comparative Study Assessing Sleep Duration and Associated Factors among Adolescents Studying in Different Types of Schools in an Urban Area of Kerala, India

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Abstract

Background: Sleep is essential for optimizing physical, cognitive, and emotional functioning of adolescents. Adolescents are one of the most sleep-deprived age groups in the society. **Objectives:** To assess sleep duration and associated factors among adolescent children studying in different types of schools in an urban area of Kerala. **Methodology:** This cross-sectional study was conducted in Pathanamthitta district, Kerala, from January to December 2017. All adolescent children studying in high school and higher secondary classes were included using stratified random sampling. Study tool included a questionnaire which collected sociodemographic information, sleep duration, and schedule. **Results:** In this study, 657 students were enrolled. The mean age of the participants was 15.09 ± 1.33 years. 201 students (30.6%) were from government school, 242 (36.8%) from aided, and 214 (32.6%) were from private school. The mean sleep duration among the students was 7.2 ± 1.26 h. Sleep duration was found to be inadequate in 60% of the children. The sleep duration was found to be longer during weekends compared to weekdays. Nearly 92% of students take a daytime nap of >1 h during weekends. Private school students had inadequate sleep duration, late bedtime, and early wake-up time compared to other students. Higher age, class, education of parents, family income, distance travelled to school, and female gender were the other factors associated with inadequate sleep among adolescents. **Conclusion:** Inadequate sleep duration and difference in sleep schedule during weekends were observed among adolescents, especially among private school students. Primary prevention approach aimed at spreading adequate awareness regarding the importance of sleep among students, parents, and teachers should be practiced.

Keywords: Adolescent, factors, schools, sleep duration, sleep, types of school

INTRODUCTION

Adolescence is a critical period which marks puberty and physical maturation, where there is a gradual transition between childhood and adulthood.^[11] Sleep affects physical, mental, and emotional development of the adolescents, and it has a potential impact on their academic performance.^[2] Adolescents should sleep 8–10 h/day on a regular basis to promote optimal health. Consistent sleep habits such as regular bedtime, wake-up time, and similar sleep schedules on weekends and weekdays help in better sleep outcomes. However, majority of them have inadequate sleep due to various intrinsic and extrinsic factors.^[3] Poor sleep has multiple effects on adolescent health which includes depression, excessive daytime sleepiness, and metabolic dysfunctions.^[4] Unlike adults, children do not usually complain of sleep problems or seek treatment.^[5] Studies

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done abroad have shown variations in the sleep pattern of children studying in different settings.^[6] Unfortunately, sleep is a neglected topic, and there are very few studies exploring sleep pattern in India.^[7] To the best of our knowledge, there are no published studies exploring sleep duration of adolescents studying in different types of schools in Kerala. Knowing about their sleep can help to intervene to promote better sleep practices and reduce sleep problems among adolescents.

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Objectives

1. To assess and compare sleep duration and associated factors among adolescent children studying in different types of schools in an urban area of Kerala.

METHODOLOGY

This cross-sectional study was conducted in Pathanamthitta district of Kerala from January to December 2017. Institutional ethical committee approval was taken for the study. Considering a 75% prevalence of good sleep practices among adolescents,^[8] 10% relative precision with 5% type 1 error, and 10% nonresponse rate, the minimum sample size was calculated to be 150 from each category. Written consent was obtained from the study participants as well as from their parent/guardian. Participants were enrolled using multistage stratified random sampling, strata being the type of school (government, government aided, and private schools). Permission to conduct the study was obtained from the principal of the schools. In the first level of sampling, schools were selected from each category, and in the second level, class divisions were randomly selected. All the students from the selected division were included.

Data were obtained from 657 adolescents by a team consisting of doctors including a pediatrician, medicosocial workers, and nurses. The questionnaire was translated into the local language and was backtranslated to ensure accuracy. The study tool included a structured self-administered questionnaire which collected information such as sociodemographic details, sickness, distance, and time travelled between home and school. Sleep duration (in 24-h time period) and the usual bedtime and wake-up time were collected separately for weekdays and weekends. Their attendance and academic performance during the study period were obtained from class records. The collected data were entered in Excel, and statistical analysis was performed using EpiInfo. Chi square test, Independent *t*-test, ANOVA, Paired *t*-test, and Pearson correlation coefficient were used.

RESULTS

The mean age was 15.09 ± 1.33 years, and 55.9% were males [sociodemographic details, Table 1]. Nearly 31% of students were from government school, 36% from aided school, and 33% from private school. Majority (63.9%) of the students had only one sibling. There was a significant difference in the sociodemographic pattern across the schools such as family income (χ^2 test = 198.9, P < 0.0001), maternal education (F = 105.6, P < 0.0001), paternal education (F = 146.1, P < 0.0001), and results (F = 27.6, P < 0.0001) (higher values in private school compared to government school). The mean time taken for travel (home to school) was 26.33 ± 15.28 min. Nearly 14% of students reported to have chronic illness like asthma.

Majority, i.e., 392 (59.1%) of the students were sleeping for <8 h/day and 61 (9.3%) for <6 h/day. The mean

Table 1: Distribution of the respondents based on sociodemographic characteristics									
Variables	Categories	Frequency (%)							
		Government (n=201)	Aided (<i>n</i> =242)	Private (n=214)					
Class	High school	118 (33.2)	107 (30.1)	130 (36.6)	355				
	Higher secondary	83 (27.5)	135 (44.7)	84 (27.8	302				
Religion	Hindu	118 (45.4)	80 (30.8)	62 (23.8)	260				
	Christian	79 (20.8)	153 (40.4)	147 (38.8)	379				
	Muslim	4 (22.2)	9 (50)	5 (27.8)	18				
Family type	Nuclear	147 (37)	138 (34.8)	112 (28.2)	397				
	Three generation	45 (21.4)	82 (39.6)	83 (39.5)	210				
	Joint	9 (18)	22 (44)	19 (38)	50				
Monthly family income	<10,000	176 (52.2)	120 (35.6)	41 (12.2)	337				
	10,000-30,000	17 (9.1)	77 (41.4)	92 (49.5)	186				
	>30,000	8 (6)	45 (33.6)	81 (60.4)	134				
Educational status (mother) (<i>n</i> =601)	Up to 10 th	42 (80.8)	9 (17.3)	1 (1.9)	52				
	10 th -12 th	144 (40.6)	152 (42.8)	59 (16.6)	355				
	>12 th	13 (6.7)	74 (38.1)	107 (55.2)	194				
	Mean years of schooling	9.9±2.1	12.9±2.9	13.7±2.2					
Educational status (father) (n=585)	Up to 10 th	67 (70.5)	25 (26.3)	3 (3.2)	95				
	10 th -12 th	118 (39.2)	130 (43.2)	53 (17.6)	301				
	>12 th	8 (4.2)	78 (41.3)	103 (54.5)	189				
	Mean years of schooling	9.3±2.1	11.83±2.7	13.8±2.3					
Exam scores (n=652)	<30%	91 (41.4)	96 (43.6)	33 (15)	220				
	30%-49.99%	59 (29.2)	66 (32.7)	77 (38.1)	202				
	≥50%	51 (22.2)	75 (32.6)	104 (45.2)	230				
	Mean examination scores	36.8±20.9	40.8±23.6	52.3±21.7					

duration of sleep as reported by them was 7.2 ± 1.2 h. The duration was significantly different in different type of schools (government - 7.29 ± 1.3 h, aided - 7.38 ± 1.2 h, private - 6.56 ± 1.1 h, F = 8.13, P < 0.0001). Nearly 72% of students were having inadequate sleep in private school. The most common (mode) bedtime, both weekdays as well as weekends, was 10 pm. However, the most common (mode) wake-up time was 6 am during weekdays and 7 am during weekends. The duration was also significantly different during weekdays $(7.4 \pm 1.2 \text{ h})$ and weekends $(9.03 \pm 1.4 \text{ h})$ with longer duration during weekends (paired *t*-test t = -25.41, P < 0.0001). The students of private school were found to have a late bedtime and early wake-up time compared to other schools. Nearly 92% of students take daytime nap of more than an hour during weekends. During weekdays, they do not get time for naps since they are in school. The sleep duration was negatively correlated with factors such as age, education of parents, distance travelled to school, and academic performance and positively correlated with attendance percentage. The duration was significantly different among males $(7.35 \pm 1.22 \text{ h})$ and females $(7 \pm 1.28 \text{ h})$ with shorter sleep duration observed among female students (t = 3.954, P < 0.0001). We have also noticed that students who reported to have chronic illness like asthma had shorter sleep duration $(7.02 \pm 1.37 \text{ h})$ compared to those who did not report any $(7.24 \pm 1.24 \text{ h})$. However, this association was not statistically significant. Factors such as income and class were also associated with sleep duration [Table 2]. We did not observe any association between sleep duration and factors such as religion, type of family, and number of siblings.

DISCUSSION

This study describes the sleep duration and associated factors among 657 urban schoolgoing adolescents studying in different type of schools. Nearly 60% of the adolescents were sleeping for a period of <8 h with a mean duration of 7.2 ± 1.26 h. Similar results were found in other studies where 45%-85% of the adolescents sleep less than the recommended hours of sleep.^[1-3] The sleep duration was longer during weekends. Weekend oversleep can dysregulate the circadian rhythm and prolong school night sleep onset latency.^[2,5,6,9-12] The sleep duration decreased with increasing age and grades. Another study done among urban adolescents showed similar results of sleep disturbances and deprivation with increased age and grades.^[2,6] We have a paradoxical finding in our study. The sleep duration was found to be negatively associated with academic performance. This is in contrast with the conventional wisdom that adequate sleep is necessary for better academic performance. It may be that students were sleeping less to put in more hours of study to achieve better results. Our finding may also be due to the fact that we have based our conclusion considering one examination test. Academic performance is influenced by other factors such as IQ. Hence, it cannot be attributed to sleep duration only. More reliable information about this relationship can be obtained through randomized controlled trials/longitudinal studies.

Private school students had inadequate sleep duration, late bedtime, and early wake-up compared to other students. Most of the studies did not make any comparisons across different type of schools. However, a study done by Meltzer *et al.* showed that students of private schools had lesser sleep

Table 2: Factors associated with sleep duration								
Variables	Categories		Duration of sleep (%)					
		<8 h	≥8 h	Total				
Type of school	Government	104 (51.7)	97 (48.3)	201	20.55, <0.0001			
	Aided	134 (55.4)	108 (44.6)	242				
	Private	154 (72)	60 (28)	214				
Gender	Males	201 (54.8)	166 (45.2)	367	8.284, 0.005			
	Females	191 (65.9)	99 (34.1)	290				
Income (Rs.)	<10,000	182 (54)	155 (46)	337	6.940, 0.031			
	10,000-30,000	123 (66.1)	63 (33.9)	186				
	>30,000	87 (64.9)	47 (35.1)	134				
Class	High school	172 (48.5)	183 (51.5)	355	40.35, 0.0001			
	Higher secondary	220 (72.8)	82 (27.2)	302				
Illness	Yes	57 (62.6)	34 (37.4)	91	0.388, 0.566			
	No	335 (59.2)	231 (40.8)	566				
Variables		Correlation coefficient		Р				
Age, duration of sleep (h)			-0.301		< 0.0001			
Paternal education (years of education), duration of sleep (h)			-0.170		< 0.0001			
Maternal education (years of education), duration of sleep (h)			-0.149		< 0.0001			
Distance of travel, duration of sleep (h)			-0.102		0.009			
Results (%), duration of sleep (h)			-0.245		< 0.0001			
Attendance (%), duration of sleep (h)			0.077		0.048			

duration compared to home school. Different academic needs coupled with parents expectations could have contributed to this finding.^[6,8] Higher income and parental education were associated with sleep deprivation among children. This is comparable with findings of the study done in Puducherry.^[5] Decreasing parental supervision and academic pressure among highly educated may be a reason behind this. There is paucity of data from developing country settings to do comparisons.^[3] Nearly 66% of the female students had inadequate sleep. Similar findings were observed in other study done among adolescents.^[13] To the best of our knowledge, this study is the only one and first of its kind in Kerala involving different schools. Health checkup for the needy and health education classes were undertaken for students and teachers by the team.

CONCLUSION

Inadequate sleep duration and difference in sleep schedule during weekends were observed among adolescents, especially among private school students. Longitudinal and qualitative studies involving students, parents, and teachers would yield better results. Similar studies in rural areas of Kerala would allow us for comparisons across regions. School curriculum should emphasize on importance of sleep, and parents and teachers should be sensitized regarding the importance of adequate sleep.

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Conflicts of interest

There are no conflicts of interest.

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