



SLEEP HYGIENE PRACTICES, SLEEP DURATION, AND ASSOCIATED FACTORS AMONG URBAN SCHOOL-GOING ADOLESCENTS AGED 10-17 YEARS IN CENTRAL INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT **Background:** Adequate sleep is essential for adolescent growth, cognition, and emotional regulation, yet short sleep and poor sleep hygiene are increasingly reported in school-going adolescents. **Objective:** To assess sleep hygiene practices, sleep duration, and associated factors among urban school-going adolescents aged 10-17 years in Central India. **Methods:** This school-based cross-sectional questionnaire study included 300 healthy adolescents from selected government and private schools in Indore, Madhya Pradesh, between April 2024 and September 2025. Sleep hygiene was assessed using the Adolescent Sleep Hygiene Scale (ASHS), and information on sleep duration, screen time, social media use, caffeine intake before sleep, outdoor activities, and bed sharing was recorded using a structured proforma. Associations with sleep-duration category were assessed using Pearson's chi-square test. **Results:** The mean age was 13.49 ± 2.27 years; 155 (51.7%) participants were female. Mean sleep duration was 7.49 ± 0.84 hours, and 201 (67.0%) adolescents reported sleeping <8 hours. The mean overall ASHS score was 3.55 ± 0.31 , with the lowest domain scores in substances (3.48) and cognitive/emotional factors (3.51). Sleep-duration category was not significantly associated with age group ($p=0.475$), sex ($p=0.774$), screen time ($p=0.598$), caffeine before sleep ($p=0.666$), outdoor activity duration ($p=0.103$), or bed sharing ($p=0.608$). **Conclusion:** Short sleep was common among urban school-going adolescents, and ASHS findings indicated scope for improvement across modifiable behavioural, cognitive-emotional, and environmental sleep practices. School-based sleep hygiene education should be incorporated into adolescent health programmes.

KEYWORDS : Adolescent Sleep; Sleep Duration; Sleep Hygiene; Adolescent Sleep Hygiene Scale; School Health

INTRODUCTION

Sleep is a basic biological requirement during adolescence, a developmental period marked by rapid physical growth, pubertal maturation, increasing academic expectations, and expanding autonomy. The American Academy of Sleep Medicine recommends 8-10 hours of sleep for adolescents to support optimal health and daytime functioning [1]. However, pubertal circadian phase delay and slower build-up of sleep pressure make adolescents biologically inclined toward later sleep onset, while early school schedules and academic demands often restrict wake time [2].

Insufficient sleep in adolescence has been described across countries and is associated with daytime sleepiness, impaired attention, poorer learning, mood dysregulation, and long-term health risks [3,4]. Indian school-based studies have similarly reported curtailed sleep duration and poor sleep practices among adolescents, particularly in urban settings where evening academic work, screen exposure, coaching classes, and lifestyle routines may compete with sleep opportunity [5-7]. Because school-going adolescents spend much of their day within structured educational settings, schools provide an important point for identifying and modifying unhealthy sleep practices.

Sleep hygiene refers to behaviours and environmental conditions that promote regular and restorative sleep. It includes consistent sleep-wake timing, avoidance of stimulating activities and substances before bedtime, a suitable sleep environment, and a calming bedtime routine. The Adolescent Sleep Hygiene Scale (ASHS) provides a multidimensional assessment of these sleep-related practices and has been validated for adolescent populations [8,9]. Local data on adolescent sleep hygiene are important because many sleep-disrupting behaviours are preventable, inexpensive to address, and suitable for school health counselling. This study was conducted to assess sleep hygiene practices, sleep duration, and associated factors among urban school-going adolescents aged 10-17 years.

MATERIALS AND METHODS

This school-based cross-sectional study was conducted in selected government and private schools in Indore, Madhya Pradesh, through the Department of Paediatrics, Index Medical College, Hospital and Research Centre, from April 2024 to September 2025. The study population comprised healthy school-going adolescents aged 10-17 years studying in classes VI-XII who could comprehend English. Participation required consent from parents or guardians.

Adolescents with chronic illness including type 1 diabetes mellitus,

tuberculosis, or hemolytic anaemia, post-traumatic stress disorder, psychiatric disorders or anxiety, and those whose parents or guardians did not provide consent were excluded. A total of 300 students were included.

Data were collected using a structured proforma and the ASHS. The proforma recorded age, sex, average sleep duration, screen time, social media use, caffeine intake before sleep, outdoor activity duration, and bed sharing. The ASHS assessed sleep hygiene across physiological, behavioural arousal, cognitive/emotional, sleep environment, sleep stability, daytime sleep, substances, and bedtime routine domains. Responses were scored on a six-point scale, and higher scores indicated better sleep hygiene practices [8,9]. Sleep duration was grouped as ≤ 6 , $>6-7$, $>7-8$, $>8-9$, and >9 hours.

Data were analysed using SPSS version 27.0. Quantitative variables were summarised as mean and standard deviation, and categorical variables as number and percentage. Pearson's chi-square test was used to assess associations between categorical variables. All p values were two-sided and $p < 0.050$ was considered statistically significant. Institutional Ethics Committee approval was obtained before initiation of the study, and confidentiality was maintained.

RESULTS

A total of 300 adolescents were included. The mean age was 13.49 ± 2.27 years; 114 (38.0%) participants were aged 10-12 years, 104 (34.7%) were aged 13-15 years, and 82 (27.3%) were aged 16-17 years. The sample included 155 (51.7%) females and 145 (48.3%) males. Screen time exceeded 4 hours in 120 (40.0%) participants, all participants reported use of social media, and caffeine intake before sleep was reported by 205 (68.3%) adolescents (Table 1).

Table 1. Baseline demographic and sleep-related profile of study participants (N=300)

Characteristic	Category	n (%)
Age group (years)	10-12	114 (38.0)
	13-15	104 (34.7)
	16-17	82 (27.3)
Sex	Female	155 (51.7)
	Male	145 (48.3)
Screen time	≤ 2 h	48 (16.0)
	$>2-4$ h	132 (44.0)
	>4 h	120 (40.0)
Use of social media	Yes	300 (100.0)

	No	0 (0.0)
Caffeine before sleep	Yes	205 (68.3)
	No	95 (31.7)
Outdoor activities	<1 h	148 (49.3)
	≥1 h	152 (50.7)
Bed sharing	No	165 (55.0)
	Yes	135 (45.0)

Data are presented as number (percentage).

The mean sleep duration was 7.49 ± 0.84 hours. Overall, 201 (67.0%) participants reported sleeping <8 hours. Five (1.7%) participants reported sleep duration of ≤6 hours, 99 (33.0%) reported >6-7 hours, 107 (35.7%) reported >7-8 hours, and 89 (29.7%) reported >8-9 hours. No participant reported >9 hours of sleep (Figure 1).

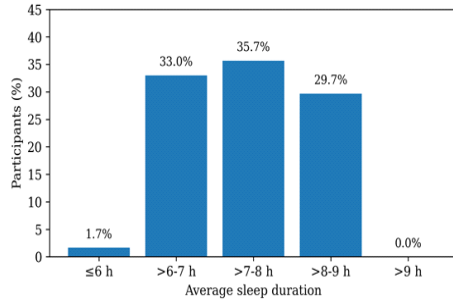


Figure 1. Distribution of participants according to average sleep duration category.

The mean overall ASHS score was 3.55 ± 0.31 , with scores ranging from 2.79 to 4.33. Domain-wise mean scores were close across ASHS domains; the lowest scores were observed for substances (3.48) and cognitive/emotional factors (3.51), while the highest were observed for bedtime routine (3.61) and sleep stability (3.61) (Figure 2).

Sleep-duration category did not differ significantly across age groups (chi-square=5.552, $p=0.475$) or sex (chi-square=1.111, $p=0.774$). No statistically significant association was observed with screen time ($p=0.598$), caffeine intake before sleep ($p=0.666$), outdoor activity duration ($p=0.103$), or bed sharing ($p=0.608$) (Table 2).

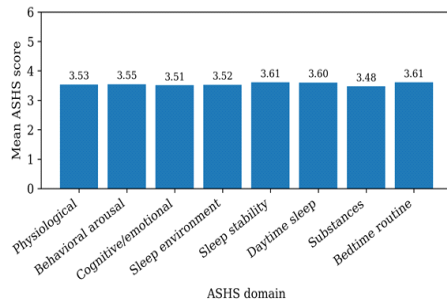


Figure 2. Domain-wise mean ASHS scores.

Table 2. Association of age, sex, and selected sleep-related factors with average sleep duration category

Category	≤6 h n (%)	>6-7 h n (%)	>7-8 h n (%)	>8-9 h n (%)	>9 h n (%)	Total	p value
Age group (years)							0.475
10-12	2 (1.8)	39 (34.2)	37 (32.5)	36 (31.6)	0 (0.0)	114	
13-15	1 (1.0)	36 (34.6)	33 (31.7)	34 (32.7)	0 (0.0)	104	
16-17	2 (2.4)	24 (29.3)	37 (45.1)	19 (23.2)	0 (0.0)	82	
Sex							0.774
Female	3 (1.9)	55 (35.5)	53 (34.2)	44 (28.4)	0 (0.0)	155	
Male	2 (1.4)	44 (30.3)	54 (37.2)	45 (31.0)	0 (0.0)	145	
Screen time							0.598
≤2 h	2 (4.2)	14 (29.2)	14 (29.2)	18 (37.5)	0 (0.0)	48	
>2-4 h	1 (0.8)	45 (34.1)	49 (37.1)	37 (28.0)	0 (0.0)	132	
>4 h	2 (1.7)	40 (33.3)	44 (36.7)	34 (28.3)	0 (0.0)	120	
Caffeine before sleep							0.666
No	1 (1.1)	28 (29.5)	38 (40.0)	28 (29.5)	0 (0.0)	95	
Yes	4 (2.0)	71 (34.6)	69 (33.7)	61 (29.8)	0 (0.0)	205	

Outdoor activities							0.103
<1 h	2 (1.4)	48 (32.4)	45 (30.4)	53 (35.8)	0 (0.0)	148	
≥1 h	3 (2.0)	51 (33.6)	62 (40.8)	36 (23.7)	0 (0.0)	152	
Bed sharing							0.608
No	4 (2.4)	57 (34.5)	57 (34.5)	47 (28.5)	0 (0.0)	165	
Yes	1 (0.7)	42 (31.1)	50 (37.0)	42 (31.1)	0 (0.0)	135	

Percentages are row percentages. p values were obtained using Pearson's chi-square test and are reported to three decimal places; the >9 h column had zero observations and was not included in chi-square calculations.

DISCUSSION

This study shows that short sleep is frequent among urban school-going adolescents. The mean sleep duration was below the recommended range, and two-thirds of participants reported <8 hours of sleep. These findings are consistent with Indian studies from urban and school-based settings that have reported inadequate sleep duration as a common adolescent health concern [5-7]. The observation that no participant reported >9 hours of sleep is also important, because it suggests that longer sleep was uncommon even in a school sample that included early adolescents. The absence of a significant association between sleep-duration category and age or sex suggests that reduced sleep was distributed across the adolescent age range rather than confined to a specific subgroup.

The ASHS profile indicated that sleep hygiene practices were not uniformly optimal, with comparatively lower scores in the substances and cognitive/emotional domains. Although the mean scores across domains were relatively close, this pattern helps identify behaviours that may deserve emphasis during counselling. Cognitive-emotional arousal before bedtime may reflect academic stress, worry, or rumination, all of which are recognised contributors to delayed sleep onset. Prior work has linked adolescent sleep difficulties with mood symptoms and poorer daytime functioning, making early recognition relevant not only for sleep health but also for emotional well-being [12,13].

Digital exposure remains an important contextual issue. Although screen-time category was not statistically associated with sleep-duration category in this sample, all participants reported social media use and 40.0% reported >4 hours of screen time. Electronic media exposure, especially in the evening, has been associated with delayed sleep, increased arousal, and shorter sleep duration in systematic reviews [10,11]. These findings support including digital hygiene as a practical component of sleep counselling.

The lack of statistically significant association with caffeine before sleep, outdoor activity duration, or bed sharing should be interpreted cautiously. Cross-sectional questionnaire data capture reported behaviours at one point in time and may not fully reflect timing, intensity, or consistency of exposures. Nevertheless, the high proportion reporting caffeine before sleep and the presence of irregular sleep-duration patterns point to modifiable practices that can be addressed through school-based education and parental guidance.

Adolescent sleep problems are influenced by biological circadian delay, academic load, technology use, and household routines. Interventions therefore need to be simple and feasible: regular sleep-wake timing, limiting evening screens and caffeine, improving the sleep environment, and using a calming bedtime routine. In routine paediatric and school health visits, asking about weekday and weekend sleep timings, bedtime device use, and caffeine consumption can provide a brief but useful screening approach. Broader school-level strategies, including sleep education and attention to schedules, have been recommended in literature [14,15].

CONCLUSION

Short sleep was common among urban school-going adolescents aged 10-17 years, and the overall ASHS profile indicated scope for improvement in modifiable sleep hygiene practices. Sleep-duration category was not significantly associated with age, sex, screen time, caffeine intake before sleep, outdoor activity duration, or bed sharing. Routine sleep assessment and structured sleep hygiene education should be integrated into school health and adolescent care programmes.

LIMITATIONS

The study was cross-sectional, so causal relationships between sleep hygiene practices and sleep duration cannot be inferred. Sleep duration and behavioural exposures were self-reported and may be affected by recall or social desirability bias. Objective sleep measures such as actigraphy or polysomnography were not used. The study was conducted among urban school-going adolescents in one region, which may limit generalisability to rural or out-of-school adolescents.

DECLARATIONS

Ethical approval: Institutional Ethics Committee approval was obtained before initiation of the study.

Conflict of interest: Nil.

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