

# Sleep-patterns, sleep hygiene behaviors and parental monitoring among Bahrain-based Indian adolescents

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## ABSTRACT

**Introduction:** Sleep plays an important role in adolescent's health and undergoes substantial changes with puberty and physical maturation with a preference for later bed times. Evidence shows that many adolescents are not obtaining the required amounts of sleep which is 9.25 h, due to inadequate sleep practices, academic and societal demands. This study aims at describing the (1) sleep patterns of adolescents on school days and weekends, (2) sleep hygiene practices and the extent of parental monitoring and (3) gender and grade level differences in sleep duration and sleep hygiene practices among Indian adolescents in Bahrain. **Materials and Methods:** Study used a descriptive correlational design. A total of 145 adolescents from 11 to 17 years from grade 6 to 12 were selected using convenience sampling. Data was collected from November 2012 to March 2013. A structured questionnaire for sleep patterns and Mastin *et al.*'s Sleep Hygiene Index for assessing sleep hygiene practices were used. **Results:** The adolescents' total sleep duration was  $7.07 \pm 1.13$  hours. A highly significant difference in sleep duration on school days and weekends between adolescents of various grade levels ( $P < 0.001$  and  $0.001$ , respectively) and between parental monitoring at the time of getting up on school days and sleep duration ( $P$  value 0.026 at 0.05 level of significance) was found. Gender was not significant with the sleep duration, and also with Sleep Hygiene Index scores. **Conclusion:** The results suggest that there is a high prevalence of insufficient sleep and irregular bed-time schedule among Indian adolescents in Bahrain. Interventions directed toward improving sleep and promoting good sleep hygiene strategies are required to improve the physical and emotional health of adolescents.

**Keywords:** Adolescents, parental monitoring, sleep, sleep-hygiene, sleep-patterns

## Introduction

Adolescence is a critical period for normal growth and development where there is a gradual transition between childhood and adulthood, and a period which marks puberty and physical maturation. Sleep, in a complex association with many other processes, plays an important role in adolescents as dramatic maturational changes in sleep and its neurobiological regulation occurs in this period.<sup>[1]</sup> The sleep patterns undergo substantial changes from childhood to adolescence characterized by a progressive delay in the sleep phase at the onset of puberty, as well as an endogenous preference for later bedtimes than children and adults.<sup>[2]</sup> At the same time, societal demands such as school schedules or external factors frequently require earlier wake times and lead to shorter total sleep time in adolescents.<sup>[3]</sup> Studies done by Carskadon shows that older adolescents may actually have a physiological need for more sleep than preadolescents.<sup>[4]</sup> National Sleep Foundation, United States

of America, 2006b, recommends 8.5–9.5 h of sleep per day for adolescents ages 13 to adult and 9–11 h of sleep for children from 5 to 12 years.<sup>[5]</sup> Longitudinal studies of sleep needs through puberty have demonstrated that adolescents need more than 9 h of sleep at night with some adolescents requiring additional sleep during the day,<sup>[6]</sup> whereas laboratory studies showed that they require 9.25 h of sleep per night,<sup>[6,7]</sup> with no difference in sleep duration of adolescents across different pubertal stages.<sup>[7]</sup> But unfortunately, the typical adolescent sleeps one to one and a half hours less than the optimal amount per night.<sup>[5]</sup>

Evidence shows that sleep duration of children has been declining in recent decades. Research shows that approximately 45% and 85% of 6<sup>th</sup>–12<sup>th</sup> grade students report sleeping less than the recommended amount during school nights.<sup>[8]</sup> Many studies have shown that adolescents on an average obtains 7.5–8.5 h per night sleep with 26.6% getting less than 6.5 h of sleep per night and only 15% of them gets 8.5 h or more.<sup>[6]</sup> A study reported 6.3 h of sleep for 10<sup>th</sup> through 12<sup>th</sup> graders in Japan, and 5.4 h of school nights sleep among 11<sup>th</sup> and 12<sup>th</sup> graders and 6.6 h of sleep among 9<sup>th</sup> and 10<sup>th</sup> graders in Korea.<sup>[9]</sup> Sleep

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deprivation is sleep less than the average and about 9 h of sleep per night for adolescents.<sup>[10]</sup>

Sleep patterns refers to variations in sleep and waking patterns (bed times and sleep duration) measured on school and weekend nights.<sup>[4]</sup> The sleep patterns of adolescents, in contrast to their childhood show a considerable delay on weekends when compared to weekdays, with a later sleep onset and offset during weekends.<sup>[11,12]</sup> A cyclical sleep deprivation or sleep debt on school days, mitigated by a “catch-up” sleep on weekends and holidays is often shown by some children and adolescents,<sup>[3,13]</sup> which makes them more difficult to fall asleep on subsequent school nights, producing an ongoing cycle of delayed sleep timing with impaired daytime functioning or causing impairment in quality of life.<sup>[14]</sup> Psychosocial factors like academic and social demands,<sup>[9,11,15]</sup> physiological concomitants of puberty,<sup>[11]</sup> and environmental factors like reduced parental influence on bedtimes, extracurricular activities, watching television, using internet and computer, and playing videogames causes a reduced sleep time.<sup>[16]</sup> An average of 1 and 2 h of difference between weekend and school-night's bedtimes is observed in older than younger adolescents.<sup>[17]</sup>

Gender-based differences in sleep had been reported in many studies, but often showed inconsistent results. No gender influence had been reported in many studies.<sup>[18-21]</sup> A Hong Kong study reported more sleep disturbances among female adolescent students.<sup>[9]</sup> In some studies, girls found to wake up earlier than boys on weekdays, but accumulated higher sleep debt resulting in delayed wake up times on weekends than boys, without a change in their sleep length.<sup>[22]</sup> These variations could be due to the differences in the measurement of sleep time or due to differences in the age group of participants in the study.<sup>[6]</sup>

Sleep hygiene refers to a variety of different practices that are necessary to have normal, quality nighttime sleep and full daytime alertness. Poor sleep hygiene practices impair cognitive and behavioral ability in children,<sup>[23]</sup> and sleep-deprived habits established in adolescence can often lead to problems during subsequent college years. Monitoring all adolescents and college-aged students for sleep insufficiency is imperative to improve both academic and emotional well-being.<sup>[24]</sup>

The adolescents in Bahrain, especially those who are in higher grades have been observed to have late evening tuition classes that subsequently delay their sleep timing, unless they complete their routine academic sessions and home works earlier. The schools earlier start time at 7.30 am in most of the schools also tends to have an effect of inadequate sleep times among adolescents. However, no published studies regarding sleep duration or sleep hygiene behaviors among Indian adolescents in Bahrain are so far available to determine the extent of their sleep problems. Thus, the aim of the present study is to examine the sleep patterns of adolescents on school days and weekends, to identify the sleep hygiene practices and the extent of parental monitoring among Indian adolescents in Bahrain and also to determine age and gender differences in sleep duration and sleep hygiene practices.

## Materials and Methods

The study used a descriptive correlational design. The data was collected from November 2012 to March 2013. Indian adolescents studying in various schools of Bahrain from grade 6 to 12 between 11 and 17 years were recruited to participate in the study using convenience sampling, by an informal method of approaching the churches and tuition centers. A written parental consent was taken for all participating adolescents. A letter to parents requesting permission for their adolescent children to participate in the study was sent and only those who gave permission were included in the study. In addition, adolescent's willingness to be a part of the study was obtained through the child assent form, as they have not attained the legal age for consent involved in research, which is 18 years. Information was collected using a structured questionnaire, and was given to adolescents in the churches during Sunday school classes to complete, and, to take it home to be filled for those from the tuition centers. Out of 145 questionnaires distributed, 140 of them were completed and returned (96.55%).

The questionnaire consisted of two parts: The first part contained 28 items and included three questions related to demographic profile such as age, sex, and grade level. The remaining questions were related to sleep duration on school days and weekends, reasons for going to bed on school days and weekends at that time, the method of getting up from sleep on school days and weekends, questions related to exercises, and afternoon napping and parental influence while going to sleep and getting up from sleep.

Questions to assess sleep duration (given on a 12-h format) on school days included “At what time do you go to bed on a typical school day?” and “At what time do you get up from sleep on a typical school day?” The same were asked for sleep duration on weekends. The total sleep duration (on school days and weekends) = (sleep duration on school days × 5) + (sleep duration on weekends × 2)/7.

Napping on school days and weekends and doing exercises were asked by “yes” or “no” questions. In addition, for those who answered “yes” were asked to indicate the duration of napping and the frequency of performing exercises.

Parental influence on sleep was assessed by questions like, “Does your parent influence the time of going to bed on school days?” and “Does your parent influence the time of getting up from bed on school days?” The same were asked to know the parental influence for going to bed and getting up from bed on weekends.

The second part assessed the sleep hygiene behaviors through a 13-item questionnaire developed by Mastin, Bryson and Corwyn, 2006.<sup>[25]</sup> The scale consisted of items to assess the presence of behavior comprising of sleep hygiene, and participants were asked to indicate how frequently they engage in specific behavior through a 5-point Likert scale. The items summed up provided a global assessment of sleep hygiene, ranging from 13 to 65, with

higher scores indicative of more maladaptive sleep hygiene status. The scale has an internal consistency of Cronbach's  $\alpha$  0.66, and good test-retest reliability, 0.71,  $P < 0.01$ .

## Results

### Profile of the respondents

Among the total of 140 adolescents, 90 (64%) were females and 50 (36%) were males. Majority (66%) were middle adolescents in the age group of 15–17 years and belonged to upper grade levels and the remaining (34%) were younger adolescents from 11 to 14 years (classified according to adolescent classification by American Academy of Pediatrics).

When grouped according to grade levels, 32 adolescents (22.86%) belonged to grade 12, 25 (17.86%) in grade 11, 39 (27.9%) in grade 10, 22 (15.7%) in grade 9, 12 (8.57%) in grade 8 and five each (3.57%) in grade 6 and 7, respectively.

### Sleep –wake patterns and sleep duration of the respondents

#### Sleep duration on school days and weekends

The time of going to bed and getting up from sleep for adolescents during a typical school day was  $10.9 \pm 0.9$  h and  $5.5 \pm 0.5$  h, respectively. The adolescents average sleep duration during school days was  $06.5 \pm 1.0$  h, much less than the average recommended sleep for this age group. The sleep debt on school days was 2.4 h, compared to the standard 9 h of sleep for this age group.

The adolescents' time of going to bed and wake times were delayed during weekends. On weekends, the time of going to bed was  $12.2 \pm 1.5$  h, 1.3 h later than school days. The wake time on weekends was  $8.6 \pm 2.1$  h. The sleep duration on a weekend was  $8.4 \pm 2.7$  h, i.e. 1.8 h more than during a school day indicating a more pronounced weekend oversleep among adolescents. The duration of sleep including both school days and weekends was  $7.07 \pm 1.13$  h.

#### Sleep duration by gender

Sleep duration by gender showed that male adolescents obtained slightly longer sleep duration on school days than female adolescents (6.7 h vs. 6.5 h, respectively). On weekends, female adolescents slept few minutes longer than male adolescents (8.4 h vs. 8.3 h, respectively). However, gender difference assessed using *t*-test for both school days and weekends for sleep duration showed that there is no statistically significant difference in sleep duration between male and female adolescents on school days and weekends since the *P* values 0.299 and 0.776 were at  $>0.05$  significance level [Tables 1 and 2].

#### Sleep duration by grade levels

Sleep duration of adolescents when grouped according to grade level on school days and weekends assessed using the Kruskal–Wallis test showed a highly significant difference in sleep duration on school days and weekends between adolescents of various grade levels since the *P* values were  $<0.001$  and  $0.001$ ,

**Table 1: Influence of gender and grade level on sleep duration on school days**

	Sleep duration on school days		Test	P
	Mean	SD		
Gender				
Male	6.7	1.0	<i>t</i> -test	0.299
Female	6.5	1.0		
Grade level			Kruskal-Wallis	$<0.001$
Grade 6	7.7	0.9		
Grade 7	7.5	0.9		
Grade 8	7.2	0.9		
Grade 9	6.9	0.9		
Grade 10	6.4	1.0		
Grade 11	6.2	0.8		
Grade 12	6.1	1.1		

SD: Standard deviation;  $P < 0.05$  level of significance

**Table 2: Influence of gender and grade level on sleep duration on weekends**

	Sleep duration on weekends		Test	P
	Mean	SD		
Sex				
Male	8.3	3.8	<i>t</i> -test	0.776
Female	8.4	1.8		
Grade level			Kruskal-Wallis	0.001
Grade 6	10.3	1.5		
Grade 7	9.1	1.1		
Grade 8	7.1	7.3		
Grade 9	8.9	1.3		
Grade 10	9.1	1.7		
Grade 11	7.6	1.6		
Grade 12	7.9	1.9		

SD: Standard deviation;  $P < 0.05$  level of significance

respectively [Tables 1 and 2]. The sleep duration of adolescents on higher grade levels were less when compared to sleep duration of adolescents on lower grade levels.

### Afternoon napping and exercises

Majority of adolescents (52.1%) reported that they take daytime naps during school days. Twenty-eight of them (38.4%) took daytime naps lasting for 1–2 h [Table 3]. During weekends, only 45 (32.1%) adolescents took daytime naps.

Only 62 adolescents (44.3%) were involved in doing exercises regularly and the remaining 78 (55.7%) were not involved in any kind of exercises.

### Parental monitoring and sleep

Eighty-four adolescents (60.0%) reported that their parents do not influence their bedtimes on school days and weekends and only 56 (40.0%) adolescents' parents influenced their bedtimes on school day. However, 60.7% adolescents' parents influenced their time of getting up from bed on school days. During weekends, only 44 adolescents (31.4%) reported that their parents influenced

their rise times and the remaining 96 (68.6%) reported that their parents did not monitor their rise times.

A significant difference between parental monitoring at the time of getting up on school days and sleep duration was obtained (*P* value 0.026 at 0.05 level of significance). Whereas parental monitoring at the time of going to bed on school days, and that at the time of getting up and sleep duration on weekends was not statistically significant [Table 4].

### Part B: Sleep hygiene index scores of respondents

The mean sleep hygiene score of adolescents was 31.0 ± 5.9. When grouped according to gender, the male adolescents obtained slightly higher sleep hygiene scores than female adolescents (Mean 31.3 ± 6.2 vs. 30.8 ± 5.8, respectively). Sleep hygiene index scores grouped according to grade levels showed varied results. The highest score was obtained among grade 10 adolescents, followed by 7<sup>th</sup> graders and 12<sup>th</sup> graders, indicating poorer sleep hygiene practices among these adolescents (Mean 32.5 ± 5.4, 32.2 ± 7.2 and 31.4 ± 5.6, respectively). However, the *t*-test and Kruskal–Wallis test to find the influence of gender and grade level on sleep hygiene practices showed no significant difference as the *P* values 0.664 and 0.282 were >0.05 level of significance.

Also, taking naps during school days and weekends and doing exercise do not show any significance with sleep hygiene practices as the *P* values 0.068, 0.253 and 0.231 respectively were at >0.05 level of significance [Table 5].

## Discussion

The present study investigated the sleep-wake patterns of Indian adolescents studying in Bahrain on school days and weekends,

**Table 3: Daytime napping with duration on school days and weekends**

	n	%
Taking naps on daytime during school days		
Yes	73	52.1
No	67	47.9
Total	140	100.0
Duration of naps during school days		
<30 minutes	8	11.0
30 min-1 h	19	26.0
1-2 h	28	38.4
>2 h	18	24.7
Total	73	100.0
Taking naps on daytime during weekends		
Yes	45	32.1
No	95	67.9
Total	140	100.0
Duration of naps during weekends		
<30 min	1	2.2
30 min-1 h	16	35.6
1-2 h	17	37.8
>2 h	11	24.4
Total	45	100.0

sleep duration, and the associations between sleep duration, sleep hygiene behaviors and parental monitoring.

The adolescents in this study obtained less than the average recommended 9 h of sleep for their age group, i.e. 6.5 h on school days, 8.4 h on weekends and an average of 7.07 h total sleep including school days and weekends. The bedtime on school days was 10.9 h and on weekends it was delayed to 12.2 h. These findings were similar to those obtained in Taiwan,<sup>[26]</sup> where 54% of middle school and 74% of high school adolescents slept less than 6–8 h on school days, and in Greece,<sup>[27]</sup> where total nocturnal sleep duration among the high school adolescents were 6.58 h and 7.28 h with afternoon napping. Also, 41.3% of South Australian adolescents obtained less than 8 h of sleep and 78% reported discrepant school versus weekend morning out of bed timings.<sup>[28]</sup> The adolescents in Bahrain obtained less sleep than Hong Kong Chinese adolescents on school nights,<sup>[9]</sup> and a much shorter sleep than Indian adolescents on school days and weekends.<sup>[18]</sup> Whereas a U.S. study showed that 23% of the adolescent respondents went to bed at 11.15 PM or later and slept fewer than the recommended 9 h of sleep.<sup>[8]</sup>

**Table 4: Relationship between parental monitoring and sleep duration**

	Sleep Duration		t-test <i>P</i>
	Mean	SD	
Parental monitoring at the time of going to bed on school days			
Yes	6.6	1.0	0.528
No	6.5	1.1	
Parental monitoring at the time of getting up on school days			
Yes	6.7	1.0	0.026
No	6.3	1.0	
Parental monitoring at the time of going to bed on weekends			
Yes	8.6	1.7	0.374
No	8.2	3.2	
Parental monitoring for getting up on weekends			
Yes	8.9	1.7	0.168
No	8.2	3.0	

SD: Standard deviation; *P* < 0.05 level of significance

**Table 5: Influence of daytime napping and exercise on sleep hygiene practices**

	Sleep hygiene index score		t-test <i>P</i>
	Mean	SD	
Taking naps on daytime during school days			
Yes	31.9	5.4	0.068
No	30.0	6.4	
Taking naps on daytime during week ends			
Yes	31.8	6.2	0.253
No	30.6	5.8	
Doing exercises regularly			
Yes	31.7	6.4	0.231
No	30.4	5.5	

SD: Standard deviation; *P* < 0.05 level of significance



Female adolescents in this study slept slightly less than male adolescents during school days (6.5 h vs. 6.7 h) and the reverse was observed during weekends for girls and boys (8.4 h vs. 8.3 h, respectively). This weekday and weekend sleep were consistent with studies in Spain and in USA.<sup>[22,30]</sup> and in contrast with sleep reported among Indian adolescents.<sup>[18]</sup> A 36 min later rise time of females, with a sleep length of 9 h 45 min and an average rise time of 10:31 on weekends than boys is reported in another.<sup>[9]</sup> However, gender differences were not significant in this study for sleep duration similar to studies in Greece, Florida, and India.<sup>[18,21,27]</sup> Whereas a significant difference between boys and girls in sleep duration was observed among German adolescents.<sup>[20]</sup>

The findings of this study indicated that a highly significant difference exists in total sleep duration between adolescents of various grade levels on both school days and weekends, where adolescents on higher grade slept less compared to adolescents on lower grade levels. Adolescents in grade 12 obtained only  $6.1 \pm 1.1$  h of sleep in comparison to adolescents in grade 6, who slept for  $7.7 \pm 0.9$  h. Similar trends were observed in Korea, where 10–12<sup>th</sup> graders slept  $5.78 \pm 1.3$  h in comparison with 5–6<sup>th</sup> graders who slept for  $7.95 \pm 1.05$  h,<sup>[16]</sup> and in Taiwan.<sup>[26]</sup>

Since 9 h is considered as the general requirement of adolescent sleep, all adolescents in this study were obtaining less than the required amount of sleep and thus are sleep-deprived. This could be explained by the fact that as the Indian adolescents enter into higher grade levels, they spend considerable time in completing school works, assignments, and projects and in addition, go for private tutoring and thus reach late at home between 7 PM and 10 PM. They also prepare for the entrance exams for getting admission to professional courses after finishing the 12<sup>th</sup> grade to further pursue their career. These make them getting reduced hours of sleep and sleeping at late hours at night. However, majority of adolescents in Bahrain took a daytime nap regularly on school days lasting 1–2 h as a method to compensate for their lost sleep similar to 60% of students in Greece.<sup>[27]</sup> But on weekends, the tendency of daytime napping was comparatively less among the adolescents and could be due to the long hours of sleep they obtain during weekends.

Majority of the adolescents in this study reported that parental monitoring was absent during school days and weekends for their bedtimes. But, most of the adolescents' rise times on school days were influenced by parents, even though majority of the adolescents rise times on weekends were not monitored by them. Parental monitoring showed significant difference with sleep duration on rise times of adolescents on school days. Randler<sup>[20]</sup> reports significant age differences in the setting of bedtimes of adolescents by parents, whereas 35% of adolescent bedtimes were set by parents on weekdays in contrast to 9% of parental setting of bedtimes on weekends. Parental monitoring was absent by the age of 17 years and in those adolescents whose sleep was not monitored by parents went to bed later than those with parental monitoring.

The adolescents in this study showed moderately poor sleep hygiene practices. The sleep hygiene practices were worse among 10<sup>th</sup> graders followed by 7<sup>th</sup> and 12<sup>th</sup> graders, even though gender and grade levels were not statistically significant. It could be due to the influence of puberty, higher amounts of stress and poor sleep hygiene practices. This study also supports previous research findings about poor sleep hygiene practices: An irregular bed/stimulating mental activity before bedtime, staying up late to study or academic commitments and earlier wake up times are associated with sleep problems in adolescents.<sup>[31-33]</sup> Whereas better sleep hygiene practices were observed among Italian adolescents than American Adolescents.<sup>[34]</sup>

This study indicates that there is a high prevalence of short sleep in adolescents, which poses a risk by making them sleep deprived. Accumulated sleep deprivation causes impairment in cognitive, vigilance and memory and mood disturbances among adolescents,<sup>[32]</sup> which can be prevented by promoting good sleep hygiene and increasing their total sleep time. In addition, the biological, behavioral and social and environmental factors have to be addressed to develop regular sleep schedules and to entrain the circadian system since poor sleep seems to be a universal and prevalent problem in modern society.<sup>[35]</sup>

There were some limitations in this study. The study used a non-probability sampling method and the sample collection from informal centers might not be representative of the more general population of Indian adolescents in Bahrain. The use of a random sampling and inclusion of an equal proportion of female and male adolescents would have been valuable. Also, the study used a cross-sectional method and the data was collected using a self-rated questionnaire. Using longitudinal studies and more objective measures for sleep like actigraphy could provide better measures about variations in sleep across adolescent population. There is also evidence that sleep quality is a better measure for adequate sleep than sleep times which has to be investigated further.<sup>[31]</sup> This will need to be addressed in subsequent research using interventional programs and strategies for better sleep practices in adolescents. Even though these limitations are present, the findings of this research may be valuable in exploring the sleep patterns and could contribute to the sleep practices among Indian adolescents in Bahrain.

## Conclusion

The study investigated adolescents' sleep patterns and its association with sleep hygiene behaviors and parental monitoring. The results suggest that there is a high prevalence of insufficient sleep and irregular bedtime schedule in adolescent students in Bahrain which give an insight into promoting good sleep practices in adolescents. Parents, teachers and researchers should be also taught about the importance of sleep in adolescents and the health consequences with lack of sleep. Interventions to help adolescents with the sleep issues, promoting good sleep hygiene strategies along with time management skills to facilitate healthy sleep are required. Future studies could consider the relationship of daytime sleepiness and the influence of sleep quality with

sleep behaviors as well as the pubertal changes associated with sleep to further understand the sleep problems in adolescents.

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