ORIGINAL RESEARCH ARTICLE

A Study on Sleep-Pattern and Sleep Hygiene Behaviors Among School Going Adolescents in Semi Urban Coimbatore

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ABSTRACT

Background: Sleep plays an important role in our life. Adolescents undergo several changes with puberty and have a preference for later bedtimes due to internet usage. Evidence shows that many adolescents are not obtaining the required amounts of sleep (8-10 hours) due to inadequate sleep practices. The objectives of this research were to study sleep-pattern among adolescents in Semi urban Coimbatore and also to determine the sleep hygiene practices among the adolescents

Methodology: This study is a school based cross-sectional study. A total of 300 adolescents from class VIII to XIIth were selected using simple random sampling. Data was collected from February to May 2018. A structured questionnaire for sleep pattern and Sleep Hygiene Index was used.

Results: The adolescents' mean sleep duration was 7.49 ± 1.12 hours on weekdays and 9.32 ± 1.55 hours on weekends. Mean Sleep Pattern Index (SPI) score was 22.48±6.9 and Mean Sleep Hygiene Index (SHI) score was 17.51±6.3 in our study.

Conclusions: Majority of the adolescents had moderate scores of sleep pattern and sleep hygiene practices. Interventions directed towards promoting good sleep hygiene strategies are required to improve the physical and emotional health of adolescents.

Key words: Adolescence, sleep quality, sleep-hygiene, sleep hygiene behaviour, parental monitoring

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INTRODUCTION

Sleep is an essential need for optimizing physical, cognitive, emotional health and for maintaining good quality of life.[1] The normal duration of sleep is 8-10 hrs during the puberty.[2] The disturbances in sleep or its deprivation or insomnia is proved to impair adolescents' ability in learning, concentrating and in emotional regulation which can lead to stress, emotional disturbance and decreased motivation.[3]

Adolescence is the phase of life between childhood and adulthood, from ages 10 to 19.[4] Adolescence being the period where major change or gradual transition happens in a person from childhood to adulthood. This is also the period where most of the habits and routines are formed in them. Around 16% of the adolescents are considered to have significant insomniacs.[5] Students also are known for their variable sleep schedules. Such schedules, along with other common student practices (e.g., alcohol and caffeine consumption) are associated with poor sleep hygiene.[6] Hence it becomes crucial that their sleep behaviours and quality is regulated and ensured to be adequate to ensure their ideal development and health.

According to ICSD, inadequate sleep hygiene is defined as a sleep disorder because of daily lifestyle activities that are inconsistent with the maintenance of good sleep quality (American academy of sleep medicine,2017).[7] Researchers have demonstrated that in clinical populations that improving sleep hygiene knowledge and practices is an effective treatment for insomnia.[8] However, researchers who have examined relationships between sleep hygiene and practices in nonclinical samples and overall sleep quality have produced inconsistent findings, perhaps because of questionable measures.[9] A study conducted on school children in Asia, Europe, US suggest that 6-37% of adolescents having difficulty in normal sleep quality about more than one of the behavioural dimensions of quality of sleep like undisturbed sleep, falling asleep etc.[10] Recently many studies showed the increasing mobile phone addiction and gaming addictions which also affects the sleep quality and increases day time sleepiness.[11] A study by Scott H had shown that heavier social media use was associated with poorer sleep patterns.[12]

Sleep hygiene has been proven to be an important predictor of sleep quality. A person's sleep hygiene plays an important role in their daily functioning. Only minimal number of research study focuses on sleep quality and practices among the adolescents in India. Not many studies have been done examining the sleep hygiene practices among adolescents in South India. Also, Coimbatore, part of Tamil Nadu is a hub for educational institution and hence there is a need to find the prevalence of sleep hygiene practices among adolescents.

As people's sleep hygiene can play an important role in their daily functioning, this present study was conducted to study the sleep patterns and Sleep hygiene behaviors among school going adolescents in semi-urban Coimbatore.

The objectives of the study were to determine the sleep patterns among adolescents and to determine the sleep hygiene practices among the adolescents of Semi urban Coimbatore.

METHODOLOGY

A cross sectional study was done among school going adolescents, both boys and girls between classes VIII to XIIth standard (aged 14 to 19 years) after obtaining assent from student and informed consent from their parents. Total of 8 schools (4 government and 4 private schools) in Coimbatore district were selected by simple random sampling. The study was done between February to May 2018. Sample size was calculated based on study by Gurjeet Kaur[13] where the prevalence of poor sleep hygiene was 77.7%. Using the formula n= Z^2pq/d^2 at 95% confidence interval and allowable error of 5%, and assuming a non-response rate as 10%, total sample size found to be 300. The Inclusion criteria was Students aged 14 to 19 years in the selected schools of Coimbatore district. And the exclusion criteria were students who suffered from psychiatric illness, who were on antiepileptic treatment and those who are not willing for the study.

Institutional ethics committee clearance was obtained at Karpagam Faculty of Medical Sciences and Research, Coimbatore on 18.12.2017 (Approval No: IHEC/117/Community Medicine/12.2017). Permission letter was obtained from the principal of the schools. Data was collected after taking Assent form duly signed from the student and Informed consent from their parents were obtained**.** Data collection was done by team of three doctors (after sensitization about the study). The schoolteachers of concerned students were kept within the classroom to ensure confidentiality of the student and to assist in proper data collection. The Study tool is a structured questionnaire which consists of two sessions- sleep pattern index and sleep hygiene index.

Part A – Sleep pattern index (SPI)
Part B – Sleep hygiene index (SHI)

The first section SPI consisted of 21 questions (15 questions on Likert scale type) and the second section SHQ consisted of 13. The SHQ items were taken from the diagnostic criteria for inadequate sleep hygiene as defined in the *International Classification of Sleep Disorders*[14]. Reliability of the questionnaire was 0.8 in previous studies[15]. SHI has shown moderate internal consistency and good 2-week test-retest stability **($r = 0.71$, $p < 0.001$)** in studies.[6] Scores are calculated on a Likert scale of 0-4 (0=never, 1=rarely, 2=sometimes, 3=frequent, 4=always) for each student and are categorized for the sleep pattern and sleep hygiene under scored categories.

Indices used in the study

A. Sleep pattern index – Scoring (SPI)	Score
Excellent	0-15
Moderate	16-30
Fair	30-45
Poor	45-60

B. Sleep hygiene index – Scoring (SHI)	Score
Excellent	0-12.5
Moderate	12.5-26
Fair	26-39.5
Poor	39.5-52

The data was analyzed using SPSS 25.0 software. Simple descriptive statistical measures were used to denote the sleep Pattern and sleep hygiene practices. Mean scores were calculated for sleep pattern and hygiene indices. Inferential statistics like independent t test and ANOVA were used appropriately.

RESULTS

Our study participants included adolescents from VIII grade till 12th grade ie., aged 14-19 years in selected schools, Coimbatore. Among these 300 participants, males constitute 49 % and females constitute 51%. The Mean adolescents' sleep duration was found to be 7.49 ± 1.12 hours on weekdays and 9.32 ± 1.55 hours on weekends (Saturdays and Sundays). The distribution of SPI and SHI scores according to demographic variables are given Tables 1 and 2.

Table 1 shows that majority of adolescents had moderate SPI scores among both the age groups <15 and > 15 years. Among males, majority had excellent SPI scores (52.1%), whereas among females most of them had fair SPI scores (55%). Most adolescents in government schools had excellent SPI scores (52.1%), whereas in Private schools' majority had fair scores (55%).

Among SHI scores, majority of the adolescents had moderate SHI scores among both age groups as seen in Table 2. Among Gender, Males mostly had fair SHI scores (70%), whereas females had moderate SHI scores (53.1%). Among classes, most adolescents had excellent to moderate SHI scores. Almost 70% of the adolescents in government schools had poor SHI scores whereas, 52.6% had moderate SHI scores in Private schools.

The table 3 shows that using independent t test, there is **no Significance difference** between Age, Gender, School and SPI. Also, there is **no significant difference** between Sex, Age, School and SHI.

Using ANOVA test, it was found that there is **Statistical significance difference** between class and SPI, with class XII having significantly high SPI compared to the other classes. Similarly, there is **Significant difference** between class and SHI, with class IX having significantly higher SPI compared to the other classes.

Table 1: Distribution of demographic variables with respect to Sleep Pattern Index (N=300)

Demographic Variables	Sleep Hygiene Index		
	Excellent (%)	Moderate (%)	Fair (%)
Age			
<15 years	36 (19.4)	129 (69.4)	21 (11.3)
>15 years	12 (10.5)	83 (72.8)	19 (16.7)
Gender			
Male	25 (52.1)	106 (50)	18 (45)
Female	23 (47.9)	106 (50)	22 (55)
Class			
VIII	17 (35.4)	45 (21.2)	9 (22.5)
IX	6 (12.5)	29 (13.7)	6 (15)
X	5 (10.4)	37 (17.5)	5 (12.5)
XI	17 (35.4)	71 (33.5)	1 (2.5)
XII	3 (6.3)	30 (14.2)	19 (47.5)
School			
Government	25 (52.1)	107 (50.5)	18 (45)
Private	23 (47.9)	105 (49.5)	22 (55)

Table 2: Distribution of demographic variables with respect to Sleep Hygiene Index (N=300)

Demographic Variables	Sleep Hygiene Index		
	Excellent (%)	Moderate (%)	Fair (%)
Age			
<15 years	45 (24.2)	126 (67.7)	15 (8.1)
>15 years	22 (19.3)	87 (76.3)	5 (4.4)
Gender			
Male	35 (52.2)	100 (46.9)	14 (70)
Female	32 (47.8)	113 (53.1)	6 (30)
Class			
VIII	24 (35.8)	41 (19.2)	6 (30)
IX	7 (10.4)	28 (13.1)	6 (30)
X	7 (10.4)	38 (17.8)	2 (10)
XI	21 (31.3)	66 (31)	2 (10)
XII	8 (11.9)	40 (18.8)	4 (20)
School			
Government	35 (52.2)	101 (47.4)	14 (70)
Private	32 (47.8)	112 (52.6)	6 (30)

Post Hoc – Tukey HSD test was used to test the significant difference between the classes based on mean difference. It revealed that there is significant difference between classes VIIIth and XIIth (p=0.00), IXth and XIth (p=0.038), Xth and XIIth (p=0.009), XIth and IXth, XIIth class (p=0.03, p= 0.00) and between XIIth and VIII, IX, XIth class (p=0.00, p= 0.009, p=0.00). VIIIth, Xth and XIth class students have more mean difference compared with IXth and XIIth class students. It concludes that SPI is poorest among IXth and XIIth class students compared to VIIIth, Xth and XIth class students.

Post Hoc – Tukey HSD test for testing significance in Mean difference of SHI between the classes revealed that there is significant difference between classes VIIIth and IXth, XIIth (p=0.017, p=0.011), IXth and VIIIth (p=0.017) and between XIIth and VIIIth class (p=0.011).

VIIIth , Xth and XIth class students have more mean difference compared with IXth and XIIth class students. It concludes that SHI is poorest among IXth and XIIth class students compared to VIIIth, Xth and XIIth class students.

Table 3: Comparison between the Age, gender, School and Class with regard to SPI and SHI (N=300)

Variables	SPI (Mean ± SD)	P – Value	SHI (Mean ± SD)	P – Value
Age[a]				
<15 years	21.95 ± 7.197	0.091	17.15 ± 6.498	0.210
>15 years	23.35 ± 6.588		18.10 ± 60.060	
Gender[a]				
Male	21.86 ± 6.898	0.119	17.71 ± 6.637	0.586
Female	23.11 ± 7.054		17.31 ± 6.052	
Class[b]				
VIII	21.28 ± 7.397	0.000*	15.79 ± 6.542	0.003*
IX	23.98 ± 6.732		19.59 ± 6.877	
X	22.26 ± 6.367		17.19 ± 5.811	
XI	20.39 ± 6.048		16.94 ± 5.513	
XII	26.71 ± 6.835		19.48 ± 6.696	
School[a]				
Government	21.86 ± 6.844	0.125	17.69 ± 6.621	0.630
Private	23.10 ± 7.077		17.33 ± 6.066	

* Indicates Statistically Significant < 0.05; [a]Using Independent t test; [b]Using ANOVA

Table 4: Sleep Pattern Questionnaire – Items (PART A) (N=300)

Item No	Item question	Most common reply	Percentage
4	At what time you go to bed on school days and weekends?	10 pm	32 %
		10.30 pm	19.5 %
5	At what time you get up from sleep?	6 am	39%
		6.30 am	19.7%
6	How many hours on an average do you sleep at night	8 hrs	43.3%
	Likert scale Responses: 0=Never, 1=Rarely, 2=Sometimes, 3=Frequenty,4=Always		
7	I take short sleeps during day time, school hours or tuition hours	Sometimes	36 %
8	My parents influence the time of going to bed	Never	18%
9	My parents influence the time of getting up from bed	Frequent	33.7%
10	I rely on alarm to wake up in the morning	Never	36.3%
11	I have difficulty in falling asleep immediately after going to bed	Sometimes	27.7%
12	I wake up during night	Never	31%
13	I have problems going to sleep after waking up at night	Never	55.3%
14	I stay awake during late night. If so what do you do? Watch Tv, Use electronic gadgets, Any other. How often does that happen?	Never	27%
15	I rely on medications to get a better night sleep	Never	87.7%
16	I have morning head aches	Never	60.3%
17	I feel tired when I wake up in the morning	Sometimes	29.3%
18	I have trouble staying wake in morning while performing daily tasks	Never	41.3%
19	I can sleep comfortably if my sleeping schedule changed	Sometimes	27.3%
20	I skip my daily exercise (running, jogging, cycling or gymnastics)	Sometimes	26.7%
21	I follow a different sleeping pattern on my school days and weekend /holidays	Always	36%

Table.5 Sleep Hygiene Questionnaire Items– (PART B) (N=300)

Item No	Item question	Most common reply	Percentage
1	I take short sleeps during day time lasting 2 or more hours	Never	51.7 %
2	I go to bed at different times from day to day	Rarely	28.3 %
3	I get out of bed at different times from day to day	Rarely	36.3 %
4	I exercise to a point of sweating on hour before going to bed	Never	69.3 %
5	I stay in bed longer than I should do 2/3 times a week	Rarely	33.7 %
6	I consume coffee/ tea, chocolate/ soft drinks before going to bed	Never	63 %
7	I do something that keeps me awake before bed time (play videogames, use internet)	Never	32.7 %
8	I go to bed feeling stressed, angry or upset or nervous	Sometimes	29 %
9	I use my bed for things other than sleeping (watch tv, read, eat or study)	Never	22.3 %
10	I sleep on an uncomfortable bed (poor mattress/pillow), (too much/not enough blankets)	Never	72 %
11	I sleep in an uncomfortable bed room (eg: too bright, too hot, too cold, too noisy)	Never	69.7 %
12	I do important work before bedtime (eg: reading, writing or studying)	Sometimes	27 %
13	I think, plan or worry when I am in bed	Always	33.7 %

Sleep pattern scores:

Mean SPI score was **22.48±6.9** in our study. Among the 300 participants, 16 % had excellent scores, **70.7 %** had moderate scores, 13.3% had fair scores and none had poor sleep pattern scores.

Sleep hygiene scores:

Mean SHI score was **17.51±6.3** in the current study. Among the participants, 27.3% had excellent scores, **71 %** had moderate scores, 6.7 % had fair scores and none had poor sleep hygiene scores.

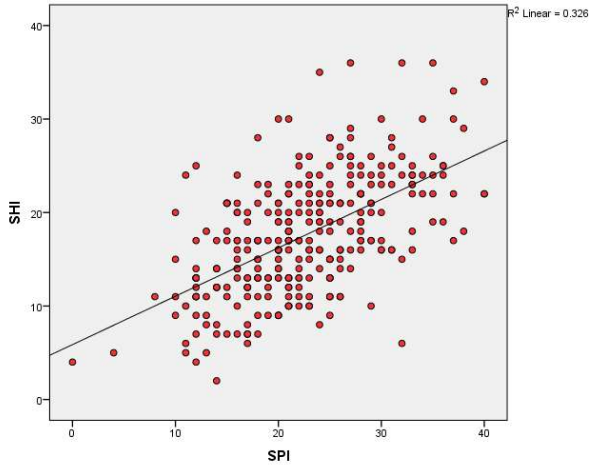

Figure 1: Scatterplot showing correlation between SPI and SHI scores.

Table 6: Correlation between SPI and SHI:

Index	Mean	Std. Deviation	N	r - Value	P - Value
SPI	22.48	6.994	300	0.571	0.000*
SHI	17.51	6.342	300		

Pearson Correlation Test was performed to correlate the SPI and SHI at 5% level of significance was observed. The table 6 shows that there is **Moderate Positive Correlation** between SPI and SHI with greater mean value among SPI index ($r = 0.571$, $p<0.05$).

DISCUSSION

In our study, the adolescents' mean sleep duration was 7.07 +/- 1.08 hours, and most common response being 8 hours (43.3%). Whereas, in a study done by Murugesan G et al., on Sleep patterns, hygiene and daytime sleepiness among adolescent school-goers in Tamilnadu, more than 64% (348) of adolescents slept ≤8 hours at night with 5.6% (30%) sleeping <6 hours.[16] This may be due to different times of conduction of the studies.

Sleep pattern:

In a study by Asarnow LD et al., on effects of bedtime and sleep duration on academic and emotional outcomes, sleep duration of children has been declining, approximately 45% and 85% of 6th–12th grade students report sleeping less than the recommended amount during school nights.[17] Most studies have shown adolescents on an average obtain 7.5 to 8.5 hours of 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.[18]

In our study, around 18% reported that their parents never had monitored them going to bed but frequently monitored the time of getting up (33.7%). Eighty-four adolescents (60.0%) reported that their parents do not influence their bedtimes on school days. However, in a study by John B on Sleep-patterns, sleep hygiene behaviors and parental monitoring among Bahrain-based Indian adolescents, 60.7% adolescents' parents influenced their time of getting up from bed on school days.[3] This difference can be because of varied habits/cultures at different places.

In our study, around 27.7% of the adolescent school goers have reported difficulty in falling asleep immediately after going to bed. Many of them, 55.3% have reported they had problems going to sleep after waking up in between sleep. In a study by Hysing M., on Sleep patterns and insomnia among adolescents. A majority of the adolescents (65%) reported sleep onset latency exceeding 30 min.[19]

In our study, around 36.3% of the adolescents did not rely on alarm for getting up. After waking up in the morning, 29.3% reported they feel tired sometimes, 60.3% never had headaches. In our study, only 27.3% reported that they can sometimes adjust to a changed sleep schedule. Around 26.7% reported sometimes they skip their daily exercises due to poor sleep and irregular sleep patterns. In a study by Figueiro M Get al., on Nature and Science of Sleep, it was found that Delayed sleep phase syndrome is a pathological shift of the normal delay in the timing of sleep onset that occurs at this age, those affected will typically go to bed between 1am and 4am and wake much later in the morning.[20]

In our study most of them, 36% had reported they follow a different sleep pattern on school days and weekends. In a study by Eliasson AH et al., it was noted that 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.[21]

In our study, the sleep hygiene score was very poor among both males and females whereas scores were poor, among males 57.9 % compared to females. According to grades, class 6 (31.3%) and class 7(28.9) had poor and very poor scores. In a study by John Bet al., on Sleep-patterns, sleep hygiene behaviours and parental monitoring, 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).[6]

In our study grade 11th adolescents had highest sleep pattern scores as compared to 9th standard who had

poorest scores. In a study by John B., on Sleep-patterns, sleep hygiene behaviours, the Sleep hygiene index scores grouped according to grade levels showed varied results. The highest score was obtained among grade 10 adolescents, followed by 7th graders and 12th graders, indicating poorer sleep hygiene practices among these adolescents (Mean 32.5 ± 5.4, 32.2 ± 7.2 and 31.4 ± 5.6, respectively).[6]

Sleep hygiene:

Majority of the adolescents 51.7% reported they never had short sleeps during day time. 28.3% had reported rarely going to bed on different times from day to day.

In our study, 36.3% reported they rarely get out of their bed. In another study by Murugesan G et al on-Sleep patterns, hygiene and daytime sleepiness among adolescent school-goers about 43% (232) reported they had interrupted sleep.[16]

In our study, Majority of them (63%) never had coffee/tea/chocolate drinks before going to bed. 29% of them had reported they go to bed stressed, angry/upset. In previous studies undertaken by McKnight-Eily LR and O'Brien EM in American 14–18-year-olds, it was demonstrated that an association exists between insufficient sleep and an increased likelihood of engaging in some health-risk behaviours, such as smoking, alcohol use, marijuana use and violence.[22]

In the current study, only 18 % used their beds for things other than sleep, while 22.3% never used for others. In a study by Murugesan G et al., on Sleep patterns, hygiene and daytime sleepiness over 64% of them had watched tv in bed and more than 23% reported use of mobile phone in bed.[3] In another study done by Rafique et al., on effects of mobile use on subjective sleep quality, it was found that average mobile screen usage time was 8.57±4.59/24 hours. It was also noted that using the mobile for at least 30 minutes before sleeping time after the lights have been turned off and keeping mobile near their pillow are positively associated with poor sleep quality.[23]

In the current study, almost 27% of adolescents had reported they sometimes do important work before going to bed. Around one third of the adolescents in our study, reported they always think, plan or worry when in bed.

SHI and SPI scores:

In our study, the Mean SPI score was 22.48 ± 6.9 and majority of the adolescents (70.7%) had moderate SPI scores. None had poor scores.

And the Mean SHI score was 17.51 ± 6.3 in the current study, and almost 71 % had moderate scores. None had poor SHI scores.

In a study by Mastin DF on Assessment of sleep hygiene using the Sleep Hygiene Index., the sleep hygiene scores among adolescents were 34.66± 6.6 and Pearson r values ranged from 0.371 to 0.458 (p,0.01)[24]. In our study the sleep hygiene scores were poor compared to that study. Whereas the Pearson correlation r value in our study was 0.571 ($p<0.05$) which is better correlated as compared to same study.

Limitations

Small sample size and selected area– question of generalizability for a larger region. We have included only the adolescents aged 14 to 19 years in our study.

Conclusion

Our study indicated that majority of the adolescents had moderate to excellent sleep pattern and sleep hygiene practices. Age wise, majority had moderate SPI and SHI scores in both below and above 15 years category, where Males mostly showed better Sleep pattern indices and females showed better Sleep hygiene indices. The Government school going adolescents had excellent Sleep pattern indices while Private school goers showed Moderate Sleep Hygiene indices. Although on comparison, the age, gender and school type were not statistically significant. Among the Classes VIII-XIIth, the students had poorest SPI and SHI among IXth and XIIth class students compared to VIIIth, Xth and XIIth class students.

This study recommends School Health education and awareness programme that focuses on the importance of healthy sleep hygiene practices and its impacts on health, needs to be emphasized among adolescents in schools. In depth studies are needed, in order to establish factors strongly associated with poor sleep hygiene and practices to make effective interventions.

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References

1. *Sleep in Middle and high school students* (2020) *Centers for Disease Control and Prevention*. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/healthyschools/features/students-sleep.htm#:~:text=Importance%20of%20Sleep&text=The%20American%20Academy%20of%20Sleep,10%20hours%20per%2024%20hours (Accessed: January 3, 2023).
2. *Sleep for teenagers* (2022) *Sleep Foundation*. Available at: https://www.sleepfoundation.org/teens-and-sleep (Accessed: January 3, 2023).

3. John B. Sleep duration and sleep hygiene practices in adolescents: Age and gender differences. Nitte University Journal of Health Science. 2014 Dec 1;4(4):65

4. *Adolescent health* (no date) *World Health Organization*. World Health Organization. Available at: https://www.who.int/health-topics/adolescent-health (Accessed: January 3, 2023).

5. Palermo TM, Toliver-Sokol M, Fonareva I, Koh JL. Objective and subjective assessment of sleep in adolescents with chronic pain compared to healthy adolescents. The Clinical journal of pain. 2007 Nov;23(9):812.

6. John B. Sleep-patterns, sleep hygiene behaviors and parental monitoring among Bahrain-based Indian adolescents. Journal of family medicine and primary care. 2015 Apr;4(2):232.

7. *New guideline - american academy of sleep medicine* (no date). Available at: https://aasm.org/resources/clinicalguidelines/040515.pdf (Accessed: January 3, 2023).

8. Brown FC, Buboltz Jr WC, Soper B. Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. Behavioral medicine. 2002 Jan 1;28(1):33-8.

9. Hansen M, Janssen I, Schiff A, Zee PC, Dubocovich ML. The impact of school daily schedule on adolescent sleep. Pediatrics. 2005 Jun 1;115(6):1555-61.

10. Brown FC, Buboltz Jr WC, Soper B. Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. Behavioral medicine. 2002 Jan 1;28(1):33-8.

11. Xie X, Dong Y, Wang J. Sleep quality as a mediator of problematic smartphone use and clinical health symptoms. Journal of behavioral addictions. 2018 Jun;7(2):466-72.

12. Scott H, Biello SM, Woods HC.Social media use and adolescent sleep patterns: cross-sectional findings from the UK millennium cohort study BMJ Open 2019;9:e031161. doi: 10.1136/bmjopen-2019-031161

13. Kaur G, Singh A (2017) Sleep Hygiene, Sleep Quality and Excessive Daytime Sleepiness among Indian College Students. J Sleep Med Disord 4(1): 1076.

14. American Sleep Disorders Association. Diagnostic Classification Steering Committee (no date) *The International Classification of Sleep Disorders: Diagnostic and coding manual*, *Google Books*. American Sleep Disorders Association. Available at: https://books.google.com/books/about/The_International_Classification_of_Slee.html?id=T0NvQgAACAAJ (Accessed: January 3, 2023).

15. Chehri A, Parsa L, Khazaie S, Khazaie H, Jalali A. Validation of the sleep hygiene index for the elderly. Journal of public health. 2021 Aug;29(4):787-93.Murugesan G, Karthigeyan L, Selvagandhi PK, Gopichandran V. Sleep patterns, hygiene and daytime sleepiness among adolescent school-goers in three districts of Tamil Nadu: A descriptive study. The National medical journal of India. 2018 Jul 1;31(4):196-200.

16. Asarnow LD, McGlinchey E, Harvey AG. The effects of bedtime and sleep duration on academic and emotional outcomes in a nationally representative sample of adolescents. Journal of Adolescent Health. 2014 Mar 1;54(3):350-6.

17. Moore M, Kirchner HL, Drotar D, Johnson N, Rosen C, Redline S. Correlates of adolescent sleep time and variability in sleep time: the role of individual and health related characteristics. Sleep medicine. 2011 Mar 1;12(3):239-45.

18. Hysing M, Pallesen S, Stormark KM, Lundervold AJ, Sivertsen B. Sleep patterns and insomnia among adolescents: a population-based study. Journal of sleep research. 2013 Oct;22(5):549-56.

19. Figueiro MG. Delayed sleep phase disorder: clinical perspective with a focus on light therapy. Nature and Science of Sleep. 2016;8:91.

20. Eliasson AH, Lettieri CJ, Eliasson AH. Early to bed, early to rise! Sleep habits and academic performance in college students. Sleep and Breathing. 2010 Feb;14(1):71-5

21. McKnight-Eily LR, Eaton DK, Lowry R, Croft JB, Presley-Cantrell L, Perry GS. Relationships between hours of sleep and health-risk behaviors in US adolescent students. Preventive medicine. 2011 Oct 1;53(4-5):271-3.

22. O'Brien EM, Mindell JA. Sleep and risk-taking behavior in adolescents. Behavioral sleep medicine. 2005 Aug 1;3(3):113-33.

23. Rafique N, Al-Asoom LI, Alsunni AA, Saudagar FN, Almulhim L, Alkaltham G. Effects of mobile use on subjective sleep quality. Nature and science of sleep. 2020;12:357.

24. Mastin DF, Bryson J, Corwyn R. Assessment of sleep hygiene using the Sleep Hygiene Index. Journal of behavioral medicine. 2006 Jun;29(3):223-7.