

RESEARCH ARTICLE

Impact of online classes, screen time, naps on sleep, and assessment of sleep-related problems in medical college students during lockdown due to coronavirus disease-19 pandemic

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ABSTRACT


Background: The blue light emitted from the screens of smartphones, tablets, and laptops (short wavelengths enriched devices) is known to suppress/delays endogenous circadian melatonin release. This can lead to increase in evening alertness, sleep latency, and timing of rapid eye movement sleep. **Aims and Objectives:** This study aims (1) to assess the effect of screen time and naps on sleep of the students and (2) to study the sleep problems among students and assess the student's perspectives about the online classes during lockdown period. **Materials and Methods:** The study was by providing questionnaire online to the 1st year MBBS students. The information about naps and screen time of students during college days and lockdown period, sleep problems faced during lockdown period, and student's perception about online classes was also recorded. **Results:** A total of 760 students enrolled in the study. Six hundred and fifty-three (85.9%) were taking nap during lockdown period. Four hundred and thirty (56.6%) reported to have faced sleep problems during lockdown period. Six hundred and fifty-five (86.2%) preferred classes in lecture theatre as better method of teaching as compared to online classes. Four hundred and eight students reported that the screen time has increased during lockdown due to using electronic gadgets for entertainment and attending online classes. The screen time increased and higher percentage of students were taking naps during lockdown. **Conclusion:** It can be concluded that the time spent by students in front of screen has increased nowadays which could have adverse effect on sleep health. To avoid negative impact of naps on nocturnal sleep, the naps must be restricted in terms of duration and frequency.

KEY WORDS: Nap; Online Education; Screen Time; Sleep Problems

INTRODUCTION

Sleep is a complex mixture of physiological and behavioral processes. Human normal sleep consists of repeated

pattern of non-rapid eye movement (REM) and REM sleep and performs functions such as memory consolidation, memorizing motor skills, conservation of energy, body repair, and brain restoration. Sleep in good quality and in adequate amount is required by every individual.^[1] The sleep wake cycle is an important circadian rhythm which is under the control of central "clock" located in suprachiasmatic nucleus (SCN) of anterior hypothalamus. Circadian rhythm is influenced by external cues like light-dark cycle, information of which is provided by retina which reach SCN through retinohypothalamic tract.^[2]

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The circadian rhythm of melatonin hormone production and release from pineal gland is also controlled by SCN. The melatonin hormone is known to produce sleep permissive state as its plasma level begins to increase near sunset and it decreases as the wake time approaches in normal individuals.^[2] The blue light emitted from the screens of smartphones, tablets, and laptops (short wavelengths enriched devices) is known to suppress/delays endogenous circadian melatonin release. This is can lead to increase in evening alertness, sleep latency, and timing of REM sleep. These findings suggest that artificial light exposure between dusk and dawn can phase shift the circadian rhythm and inhibit sleep promoting neurons. Artificial light during night increases alertness transiently and directly interferes with sleep and can lead to chronic sleep deficiency.^[2,3]

If a person is not able to get required amount of sleep for one or multiple nights, the condition is known as sleep restriction. Sleep restriction may result from medical conditions, work demands, and social responsibilities. Accumulated sleep loss results in increased risk of errors, injuries, conflicts, health complaints, and drug and alcohol use.^[2]

With the outbreak of coronavirus disease-19 pandemic, nationwide lockdown came into force from March 24, 2020, following the orders of Government of India.^[4] Before implementation of lockdown, various universities suspended the teaching in colleges for indefinite time. Amidst lockdown, institutions across India resumed teaching by various online modes so that the academic loss can be compensated during the lockdown period.^[5] With ease of attending online classes from home, the online method of teaching is associated with exposure of mobile/tablet/laptop screen and student had to remain sedentary for a prolonged duration. The prolonged exposure of artificial light from electronic gazettes can have deleterious effects on health.

The present study was undertaken to assess the effect of screen time and naps on sleep of the students. The aim of the study was to study the sleep problems among students and assess the student's perspectives about the online classes during lockdown period.

MATERIALS AND METHODS

The study was conducted by online survey on the 1st year MBBS students of government medical colleges situated in the state of Madhya Pradesh. The questionnaire containing items to record information about naps, screen time, and sleep problems during usual college days and during lockdown period was prepared by the authors of the study. The questionnaire was validated by subject experts. The internal consistency (Cronbach's alpha reliability) was 0.71. The participation of the students was voluntary with the assurance of keeping the entire student's information confidential.

After obtaining Institutional Ethical Committee clearance, explanation about the purpose of the study was given to the students. Only 1st year MBBS students who were willing to participate after the informed consent were included in the study.

The questionnaire consists of two sections. The first section consists of items to provide demographic details in the form of name, age, sex, name of college, and year of admission in MBBS course. The second section of questionnaire had items to provide information about following:

- Naps duration, frequency of naps in a week during college days and lockdown period
- Screen time during college days and lockdown period
- Sleep problems faced during lockdown period
- Student's perception about online classes.

The questionnaire was converted to an online form and was provided to participants in the 1st week of May 2020 with the dead line of 7 days to finish the data collection.

Statistical Analysis

The information provided by students was collected in MS Office Excel software. Wilcoxon signed-rank test and Chi-square test were used for statistical analysis in the commercially available statistics analysis software SPSS version 20 for Windows.

RESULTS

In the present study, 760 students provided all the information sought in the questionnaire. Three hundred and seventy-five (49.3%) were male and 385 (50.7%) were female participants, age ranging between 17 years and 25 years. The percentage of students taking nap during college days and lockdown period was 73.6% and 85.9%, respectively [Table 1]. Four hundred and thirty (56.6%) students reported that they have faced sleep problem at some point of time during lockdown [Table 2]. Six hundred and fifty-five (86.2%) students preferred classes in lecture theater as better method of teaching as compared to online classes [Table 3].

The duration of nap during lockdown was significantly ($P < 0.001$) associated with frequency of naps per week. The most common duration of naps irrespective of frequency of

Table 1: Distribution of students according to naps

Daytime naps	During college days (%)	During lockdown period (%)	χ^2 test
Yes	559 (73.6)	653 (85.9)	$\chi^2 (1, n=760)=3.316, P>0.05*$
No	201 (26.4)	107 (14.1)	
Total	760	760	

*Not significant

naps per week was 1–2 h [Table 4]. Out of 430 students who faced some problem with sleep, 393 (91.4%) students were taking nap during the lockdown period. The habit of taking naps was significantly ($P < 0.001$) associated with sleep problem during the lockdown period [Table 5].

Out of 393 students who reported to have faced problem associated with sleep during lockdown, only 14 (3.6%) reported that their nap duration was <30 min, remaining reported to have nap duration of more than 30 min [Table 6].

It can be observed from Table 7 that approximately 90% or more than 90% of students who had difficulty falling asleep or maintaining sleep respectively were taking daytime naps. There was no significant association between types of sleep problem and naps duration during lockdown.

There was a significant association ($P < 0.001$) between duration of screen time during college days and lockdown period. It can also be observed from Table 8 that during lockdown, maximum number of students (630) were using electronic gazettes for more than 2 h daily. The highest percentage increase during lockdown was recorded among students who were having screen time of more than 2 h as compared to screen time during college days.

Table 2: Distribution of sleep problems during lockdown (n=430)

Type of sleep problem during lockdown period	Number (%)
Difficulty falling asleep	182 (42.30)
Difficulty in maintaining sleep	54 (12.60)
Waking up too early in the morning	43 (10.00)
Sleep for long duration than usual	151 (35.10)
Total	430 (100)

Table 3: Student’s preference for teaching method

Preferred method of teaching	Number (%)
By lectures in a classroom	655 (86.2)
By online lectures	105 (13.8)
Total	760

Table 4: Distribution of naps duration and frequency

Duration of naps	Frequency of naps during lockdown period per week (n=653)				Total (%)	χ^2 test
	1 or 2 days (%)	3–4 days (%)	5–6 days (%)	Every day (%)		
<30 min	13 (6.10)	5 (3.20)	1 (1.90)	3 (1.30)	22 (3.40)	$\chi^2 (9, n=653)=58.725, P<0.001^*$
30 min–1 h	82 (38.30)	47 (29.90)	6 (11.10)	38 (16.70)	173 (26.50)	
1–2 h	106 (49.50)	82 (52.20)	35 (64.80)	134 (58.80)	357 (54.70)	
More than 2 h	13 (6.10)	23 (14.60)	12 (22.20)	53 (23.20)	101 (15.50)	
Total	214 (100)	157 (100)	54 (100)	228 (100)	653 (100)	

*Significant

Wilcoxon signed-rank test shows statistically significant ($P < 0.001$) changes in screen time during lockdown as compared to screen time during college days. The Wilcoxon signed-rank test shows that screen time increased in 467 (61.4%) students during lockdown period as compared to their screen time during college days [Table 9].

Out of 630 students whose screen time was more than 2 h, 408 (64.8%) students reported that the screen time has increased during lockdown due to using electronic gazettes for entertainment and attending online classes. The duration of screen time during lockdown was significantly associated with purpose of electronic gazettes [Table 10].

Out of 182 students who reported difficulty falling asleep, 159 (87.4%) were having screen time of more than 2 h during the lockdown period. The sleep problem among students was significantly ($P < 0.05$) associated with screen time they were exposed to during the lockdown period [Table 11].

DISCUSSION

The present study highlighted the napping habits, screen time among the 1st year MBBS students. Among these students, a high prevalence of nap was found during college days and lockdown period in the present study. Furthermore, the percentage of students taking naps increased during lockdown period as compared to college days. More than 50% of students faced at least one sleep problem during lockdown period. There was an increase in screen time during lockdown as compared to screen time during college days. The traditional classroom teaching was preferred by majority of the students as compared to online method.

Naps during daytime are considered beneficial in many cultures.^[1,6] The habit of taking habitual/scheduled naps is found in many individuals. Naps are beneficial or have some adverse effects which are debatable. Naps can be associated with underlying sleep disorders. In a study by Yue Leng et al., 2014, daytime nap of 1 h/day was associated with 32% increase in the risk of all-cause mortality during follow-up.^[7] The habit of napping during day is more common in older

Table 5: Distribution of sleep problem and nap during lockdown (*n*=760)

Sleep problem during lockdown	Nap during lockdown (%)		Total (%)	χ^2 test
	Yes	No		
Yes	393 (91.4)	37 (8.6)	430 (100)	χ^2 (1, <i>n</i> =760)=24.533, <i>P</i> <0.001*
No	260 (78.8)	70 (21.2)	330 (100)	
Total	653 (85.9)	107 (14.1)	760 (100)	

*Significant

Table 6: Distribution of sleep problem and duration of naps (*n*=653)

Sleep problem during lockdown	Duration of naps during lockdown (%)				Total (%)
	<30 min	30 min–1 h	1–2 h	More than 2 h	
Yes	14 (3.60)	102 (26.00)	204 (51.90)	73 (18.60)	393 (100)
No	8 (3.10)	71 (27.30)	153 (58.80)	28 (10.80)	260 (100)
Total	22 (3.40)	173 (26.50)	357 (54.70)	101 (15.50)	653 (100)

Table 7: Distribution of types of sleep problem and nap during lockdown (*n*=430)

Types of sleep problems during lockdown	Naps during lockdown (%)		Total (%)	χ^2 test
	Yes	No		
Difficulty falling asleep	163 (89.60)	19 (10.40)	182 (100)	χ^2 (3, <i>n</i> =430) =1.659, <i>P</i> >0.05*
Difficulty in maintaining sleep	50 (92.60)	4 (7.40)	54 (100)	
Waking up too early in the morning	39 (90.70)	4 (9.30)	43 (100)	
Sleep for long duration than usual	141 (93.40)	10 (6.60)	151 (100)	
Total	393 (91.4)	37 (8.6)	430 (100)	

*Not significant

individuals.^[8] In the present study, the prevalence of daytime naps was high, that is, 73.6% and 85.9% in college days and lockdown period, respectively. A review on adult napping by Dinges DF reported the prevalence of naps in 75% percent of healthy adults.^[9] A study by Lovato *et al.*, 2014, reported napping prevalence of 53.6% among the 1st year university students.^[10] Most common duration of nap observed in the present study was 1–2 h which is in contrast to a study by Lovato *et al.*, 2014, who reported long nap of 2 h in 61% of students.^[10] Studies have suggested that naps of short duration and before 3 pm in the afternoon are recommended to avoid its effect on nocturnal sleep.^[2] The percentage of students taking naps of more than 30 min during lockdown was 96.6%. The percentage of students who were napping every

Table 8: Distribution of screen time

Daily screen time	During college (%)	During lockdown (%)	χ^2 test
30 min	57 (7.5)	23 (3.00)	χ^2 (9, <i>n</i> =760)=263.119, <i>P</i> <0.001*
½–1 h	144 (18.90)	23 (3.00)	
1–2 h	328 (43.20)	84 (11.10)	
>2 h	231 (30.40)	630 (82.90)	
Total	760 (100)	760 (100)	

*Significant

Table 9: Distribution of change in screen time

Change in screen time during lockdown as compared to college days	Number of students (%)
Screen time increased	467 (61.4)
Screen time decreased	20 (2.6)
No change in screen time	318 (36.0)
Total	760

(Wilcoxon signed-rank test *Z*=-18.667, *P*<0.001)

day during lockdown period was 35%. The duration of naps was either 1–2 h or more than 2 h among everyday napping students. The home confinement could be the reason behind high percentage of napping during lockdown in the present study. Spending more time at home with no or little work/physical activity to do could have led to more tendencies toward daytime naps among participants this study. In the present study, 430 (56.6%) students reported to have faced at least one sleep problem during lockdown. Majority of them had difficulty falling asleep or difficulty in maintaining sleep. Naps among students are found to be associated with problems of cognition such as difficulty in organizing thoughts, concentration difficulties, feeling sleepier, and depressed than students who did not nap.^[10] A great increase in screen time during lockdown was observed in the present study as compared to screen time during college days. The screen time increased in 61.4% of students during lockdown as compared to college days. About 82.9% of students had screen time of more than 2 h daily during lockdown. The reasons for this change were socializing on internet and scheduled online lectures following the notifications issued by Madhya Pradesh Medical Science University, Madhya Pradesh. In the present study, 87.4% and 70.4% of students who faced difficulty falling asleep and difficulty in maintaining sleep, respectively, were having screen time of more than 2 h during lockdown [Table 11]. The screen of electronic gazettes such as smartphones, tablets, and computers emits light which is of short wavelength. The short wavelength of 460 nm is similar to blue light of visible spectrum. The artificial blue light of these devices is known to suppress/delay the endogenous release of melatonin which led to increase evening alertness and sleep latency by shifting the circadian rhythm and inhibiting the sleep promoting neurons.^[1–3] Due to lockdown, college/universities started online lectures for

Table 10: Distribution of reasons leading to more screen time during lockdown

Duration of screen time during lockdown	Reasons for more screen time during lockdown (%)				Total	χ^2 test
	Using TV/mobile phone/computer for entertainment	Using TV/mobile phone/computer for attending online classes	Both	Screen time unchanged		
30 min	4 (17.40)	6 (26.10)	9 (39.10)	4 (17.40)	23 (100)	χ^2 (9, $n=760$) =46.787, $P<0.001^*$
½-1 h	2 (8.70)	5 (21.70)	14 (60.90)	2 (8.70)	23 (100)	
1-2 h	6 (7.10)	17 (20.20)	56 (66.70)	5 (6.00)	84 (100)	
>2 h	143 (22.70)	67 (10.60)	408 (64.80)	12 (1.90)	630 (100)	
Total	155 (20.40)	95 (12.50)	487 (64.10)	23 (3.00)	760 (100)	

*Significant

Table 11: Distribution of sleep problems and screen time

Duration of screen time	Sleep related problems during lockdown (%)				Total	χ^2 test
	Difficulty falling asleep	Difficulty in maintaining sleep	Waking up too early in the morning	Sleep for long duration than usual		
30 min	2 (1.1)	4 (7.4)	4 (9.3)	4 (2.6)	14 (3.3)	χ^2 (9, $n=430$)=18.897, $P<0.05^*$
½-1 h	5 (2.7)	4 (7.4)	2 (4.7)	3 (2.0)	14 (3.3)	
1-2 h	16 (8.8)	8 (14.8)	6 (14.0)	14 (9.3)	44 (10.2)	
>2 h	159 (87.4)	38 (70.4)	31 (72.1)	130 (86.1)	358 (83.3)	
Total	182 (100)	54 (100)	43 (100)	151 (100)	430 (100)	

*Significant

students. The participants of the study were asked to provide their preference for teaching mode among online classes and classes in lecture theater in the questionnaire. The lecture in a classroom was preferred by 86.2% of students for studying. Similar preference of face-to-face teaching was also observed in a study by Kemp and Grieve.^[11] In our study, no eye contact with the teacher, unable to focus, and concentrate due to distraction created by family members and by notifications received on WhatsApp/social networking sites, low quality or no audio and video feed of the lecture, very less teacher students interaction, and problem in writing notes were some of the limitation reported by students about online teaching. Headache, neck pain, strain, and pain in eyes after watching screen for long time are some of the health issues faced by the students in the present study while attending online lectures. A study by Deshpande *et al.* on effects of internet and social media use also reported similar health issues among medical students.^[12]

The present study has certain limitation. The sleep habits of students during different condition could have been explored by taking information about bedtime, wake time, and by assessing sleep quality. The student’s perspective about advantages and disadvantages of online teaching could be explored further.

CONCLUSION

It can be said that the time spent by students in front of screen has increased nowadays which could have adverse effect on

sleep health. To avoid negative impact of naps on nocturnal sleep, the naps must be restricted in terms of duration and frequency. Although due to prevailing conditions during lockdown, teaching by online method was the easiest and safest mode available. However, in future as normalcy is retained, the finding of this study suggests that lecture in a classroom would always be superior and effective way of teaching. The classroom teaching has advantage of making the environment conducive to learning. In future planning for implementation of online teaching, authorities and decision-makers have to always consider the fact that online classes are associated with factors such as unavailability of smartphones or computers with the students, poor network connectivity in remote areas, and poor power supplies. More screen time is also associated with prolonged sedentary posture and prolonged exposure to artificial screen which can have deleterious effects on the sleep health of individual.^[1,2] It is also recommended that the current curriculum of medical education system must include a separate section which can educate the students about proper sleep hygiene and judicious use of electronic gazettes with screen.

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