

Changes in Sleep Across Different Phases of Life of Medical Students and Impact of Home Confinement on Sleep during COVID-19 Lockdown

SHAILESH KUMAR¹, JITENDRA MAHOUR², RAVIKANT ARJARIYA³, JAIDEV SINGH⁴



ABSTRACT

Introduction: Sleep is indispensable. The sleep habits changes with age and is influenced by external factors. The nationwide enforcement of complete lockdown lead to home confinement of all the students as classes in colleges were suspended on orders of the Government of India.

Aim: To find out changes in the sleep pattern and quality in different phases of life of the students namely from school days, to college days and during the period of home confinement during COVID-19 pandemic.

Materials and Methods: A questionnaire in the form of online form was shared with the students of MBBS first year in four Government medical colleges of Madhya Pradesh during nationwide lockdown on 1st May, 2020. The information about sleep pattern, usual bed time, average duration of sleep, sleep quality and student's perception about adequate sleep during college days and during lockdown period was recorded. The statistical analysis was done by Wilcoxon signed rank test, and Chi-square test. The satisfaction with sleep quality was recorded on a five point Likert's scale as very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied and very satisfied.

Results: A total 760 students participated in the present study. During usual college days among all participants, majority

373 (49.1%) of them had night owl type of sleep pattern. Maximum number of students 358 (47.10%) had morning lark type of sleep pattern during school days. The highest percentage of students 271 (35.7%) with no fixed pattern of sleep was observed during the period of home confinement due to lockdown. A total of 383 (50.4%) students reported that their average duration of night sleep during usual college days was six to seven hours per day. A total of 698 (91.8%) students reported that they are able to take adequate sleep at home during lockdown period. A statistically significant association was found between sleep pattern during college days and gender of participants (p -value <0.01). Wilcoxon signed rank test results showed statistically significant ($p < 0.001$) change in number of students whose bed time changed during college days as compared to school days and during lockdown as compared to bed time during college days.

Conclusion: In majority of the participants, sleep pattern changed to night owl type during college days from morning lark type during school days. The home confinement in lockdown period due to global viral pandemic has positively impacted sleep of students in terms of bed time, sleep quality and quantity.

Keywords: College, Isolation, Sleep pattern, Sleep quality

INTRODUCTION

Sleep is essential body function by the brain and for the brain. Sleep has various functions like body repair, brain restoration, memory and learning, promotion of neuronal synaptic plasticity and integrity, immunocompetence, thermoregulation and energy conservation [1]. Sleep in good quality as well as in adequate amount is essential for an individual to gain recuperative effects of sleep [2]. A good quality sleep is one which is continuous and sufficient in duration. A person's sleep need is the amount of sleep needed to perform optimally and without decrements in performance and vigilance [1]. Sleep needs for an individual to have normal physical and mental functions are dependent on many factors. These factors include behavioural, genetic components and length of prior waking period [1]. The average sleep requirements vary with age and from one individual to other. In adulthood, the average sleep requirement is seven to eight hours [3]. The sleep pattern also varies in individuals according their circadian and homeostatic sleep deprives. Some prefer to go to bed late in the night and wake up late in the next morning, while some prefer to go to bed early and wake up early in the morning and some individuals could have irregular sleep pattern.

According to two process model of sleep regulation, human sleep is determined by homeostatic process and circadian process.

Homeostatic process depends on previous amount of sleep and wake period. The circadian process modulates the timing and propensity of sleep. In addition to light and dark phases of a day, circadian process is also governed by other factors such as meal time and physical activity during day [4]. In India, the first nationwide lockdown was ordered by Government of India on 24th March 2020 due to outbreak of COVID 19 pandemic. As preventive measure, people were confined to their home in order to prevent the spread of viral contamination. The students were confined to their home or hostels, as teaching in college was also suspended till further notice [5,6].

The present study was undertaken to assess the sleep habits of first year MBBS students during usual college days and possible impact of long-term home confinement on sleep. The aim of this study was to find out changes that had occurred in the sleep pattern and quality in different phases of life of the students namely from school days, to college days and during the period of home confinement during COVID 19 pandemic.

MATERIALS AND METHODS

The cross-sectional study was conducted in the form of online survey simultaneously in four Government Medical Colleges, situated in the state of Madhya Pradesh, India. A questionnaire was prepared by

collaboration of all the authors of the study and was validated by subject experts. The internal consistency (Cronbach's alpha reliability) was 0.73. Ethical clearance was taken by each author from their respective Institutional Ethical Committee (No/Stud/IEC/2020/6018 dated 29th April 2020). A pilot study, using online survey form, was done on 100 first year MBBS students of a government medical college in Madhya Pradesh. The selected college for pilot study was other than these four colleges included in the study. The response rate in the pilot study was 94%. The responses by students to each item, feedback about readability and clarity of question were assessed. Twelve participants submitted the complete form twice in the pilot study. Their response was counted once only. After the pilot study, this issue was corrected by adding feature of submitting one form each participant to prevent duplication of data.

A total of 796 first year MBBS students from four colleges were added on a freely available mobile messaging application. They were provided with written explanation of aims and objectives of the study and informed consents were obtained. The students were informed that completion of the questionnaire was voluntary; assurance was given that the information provided by them would be kept confidential and non-participation would not have any adverse repercussions on their academics. The questionnaire was converted to Google form and the link of form was shared in four groups of the students on 01 May 2020 that is 37 days after the first announcement of nationwide lockdown. The data collection was done in two days. No response or incomplete information provided by the students was considered as denial of consent.

Inclusion and Exclusion criteria: Only first year MBBS students of four colleges were included in the present study as only the first year students in each college were connected with teachers of the respective college on the freely available messaging mobile application. Incompletely filled forms were excluded from the study. The demographic details in the form of name, age, sex, name of college and year of admission in MBBS course was collected in the initial section of questionnaire. The remaining section of questionnaire had items to submit information about following:

- The type of sleep pattern during school days, usual college days, during lockdown period. The sleep patterns/chronotypes are individual's sleep phase preference within 24 hours [7]. Sleep pattern was divided into night owl, morning lark and no fixed pattern. The individual who preferred to go to bed late for sleep was considered as 'night owl' while those who wake up early in the morning was considered as 'morning lark type'. If the individual did not have either of these sleep patterns, it was defined as 'no fixed pattern' of sleep.
- The usual bed time to go sleep at night during school days, college days and during lockdown period.
- Average duration of sleep during school days, college days and during lockdown period.
- Satisfaction with sleep quality during school days, college days and during lockdown period. The satisfaction with sleep quality was recorded on a five point Likert's scale. The five levels of satisfaction with sleep quality designated were very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied and very satisfied.
- Student's perception on whether they were able to have adequate sleep during school days, college days and during lockdown period. The perception about sleep adequacy was solely decided by the participants.

STATISTICAL ANALYSIS

The responses submitted by students was collected in MS office excel software. The statistical analysis was done by Wilcoxon signed rank test, and Chi-square test with the help of commercially available statistics analysis software SPSS version 20 for windows.

RESULTS

Out of 796 enrolled students from four different medical colleges of Madhya Pradesh, a total 760 students (375 male, 385 female) provided complete information in the questionnaire. In the present study, the response rate was 95.5%. The age of students ranged between 17 years to 25 years.

Maximum number of students 358 (47.10%) had morning lark type of sleep pattern during school days. During usual college days among all participants, majority 373 (49.1%) of them had night owl type of sleep pattern. The highest percentage of students 271 (35.7%) with no fixed pattern of sleep was observed during the period of home confinement due to lockdown [Table/Fig-1]. A statistically significant association was found between sleep pattern during college days and gender of participants. Out of 373 participants who had night owl type of sleep pattern during college days, 205 were males and out of 183 participants who had morning type of sleep pattern during college days, 111 were females [Table/Fig-1].

Sex	Type of sleep pattern				χ^2 test
	Night owl n (%)	Morning lark n (%)	No fixed pattern n (%)	Total	
Types of sleep pattern during school days					
Male	128 (34.1%)	173 (46.10%)	74 (19.7%)	375 (100%)	χ^2 (2) =1.976, p>0.05
Female	139 (36.1%)	185 (48.10%)	61 (15.8%)	385 (100%)	
Total	267 (35.1%)	358 (47.10%)	135 (17.8%)	760 (100%)	
Type of sleep pattern during college days					
Male	205 (54.7%)	72 (19.2%)	98 (26.1%)	375 (100%)	χ^2 (2) =12.166, p<0.01*
Female	168 (43.6%)	111 (28.8%)	106 (27.5%)	385 (100%)	
Total	373 (49.1%)	183 (24.1%)	204 (26.8%)	760 (100%)	
Type of sleep pattern during lockdown period					
Male	130 (34.7%)	117 (31.2%)	128 (34.1%)	375 (100%)	χ^2 (2) =2.474, p>0.05
Female	113 (29.4%)	129 (33.5%)	143 (37.1%)	385 (100%)	
Total	243 (32.0%)	246 (32.4%)	271 (35.7%)	760 (100%)	

[Table/Fig-1]: Sex wise distribution of sleep pattern during three phases of life (N=760).

*Significant; p-value <0.05 to be considered significant

The types of sleep pattern of participants in school days were compared with that in college days and lockdown period. Also, the types of sleep pattern in college days were compared with that during lockdown period. The results show no significant association between types of sleep pattern and different phases of life [Table/Fig-2].

Different phases of life	Types of sleep pattern			Total	χ^2 test
	Night owl n (%)	Morning lark n (%)	No fixed pattern n (%)		
School days	267 (35.1%)	358 (47.10%)	135 (17.8%)	760 (100%)	*1.478, p>0.05
College days	373 (49.1%)	183 (24.1%)	204 (26.8%)	760 (100%)	^8.78 4, p>0.05
Lockdown period	243 (32.0%)	246 (32.4%)	271 (35.7%)	760 (100%)	**1.974, p>0.05,

[Table/Fig-2]: Association between types of sleep pattern with different phases of life.

*Comparing school with college days; **Comparing school days with lockdown period;

^Comparing college days with lockdown period

Out of 760 students, 439 (57.8%) reported that their usual time to go to bed was after midnight during college days [Table/Fig-3]. Wilcoxon signed rank test results showed statistically significant (p<0.001) change in number of students whose bed time changed during college days as compared to school days and during lockdown as compared to bed time during college days. The Wilcoxon signed rank test shows that bed time shifted to a later time in 374 (49.2%) students during college days as compared to bed time during school days [Table/Fig-4].

There was significant (p<0.001) association between sleep duration during school and college days. The [Table/Fig-5] shows that percentage of students taking 7 to 8 hours sleep decreased

Usual bed time	During school days n (%)	During college days n (%)	During lockdown period n (%)
Between 09-10 pm	88 (11.6%)	5 (0.7%)	43 (5.7%)
Between 10-11 pm	134 (17.6%)	48 (6.3%)	137 (18.0%)
Between 11-12 pm	230 (30.3%)	216 (28.4%)	186 (24.5%)
After midnight	226 (29.7%)	439 (57.8%)	298 (39.2%)
No fixed time to go to bed	82 (10.8%)	52 (6.8%)	96 (12.6%)
Total	760 (100%)	760 (100%)	760 (100%)

[Table/Fig-3]: Distribution of students according to their usual bed time (N=760).

Change in usual bed time	During college days as compared to bed time during school days n (%)*	During lockdown as compared to bed time during college days n (%)**
Bed time shifted to a later time	374 (49.2%)	162 (21.3%)
Bed time shifted to an earlier time	180 (23.7%)	280 (36.8%)
No change in bed time	206 (27.1%)	318 (41.8%)
Total	760 (100%)	760 (100%)

[Table/Fig-4]: Distribution of shift in bed time during college days as compared to school days and during lockdown as compared to college days.

*Wilcoxon Signed-Rank Test Z=-9.787, p<0.001; **Wilcoxon Signed-Rank Test Z=-6.342, p<0.001

Average duration of sleep	During school days number (%)	During usual college days number (%)
<6 hours	103 (13.6%)	190 (25.0%)
6-7 hours	134 (17.6%)	383 (50.4%)
7-8 hours	434 (57.1%)	167 (22.0%)
>8 hours	89 (11.7%)	20 (2.6%)
Total	760 (100%)	760 (100%)

[Table/Fig-5]: Distribution of average duration of sleep during school and college days.

χ^2 (9, N=760)=139.9, p<0.001 (significant)

during college days in comparison to school days. Also, there was significant (p<0.001) association between sleep duration during college days and during lockdown period. It can be observed from the [Table/Fig-6] that percentage of students taking 7-8 hours or more than 8 hours sleep increased during home confinement as compared to college days. A total of 383 (50.4%) students reported that their average duration of night sleep during usual college days was 6-7 hours per day which decreased to 127 (16.7%) students during the period of home confinement. A total of 167 (22.0%) students reported that average duration of night sleep during usual college days was 7-8 hours per day which increased to 338 (44.5%) during the period of home confinement. The proportion of students taking sleep of less than 6 hours or 6-7 hours also reduced during lockdown period as compared to college days.

Average duration of sleep	During usual college days Number (%)	During lockdown period Number (%)
<6 hours	190 (25.0%)	30 (3.9%)
6-7 hours	383 (50.4%)	127 (16.7%)
7-8 hours	167 (22.0%)	338 (44.5%)
>8 hours	20 (2.6%)	265 (34.9%)
Total	760 (100%)	760 (100%)

[Table/Fig-6]: Distribution of average duration of sleep during college days and lockdown period.

χ^2 (9, N=760)=62.11, p<0.001 (significant)

The Wilcoxon signed rank test show statistically significant (p<0.001) changes in number of students in which average duration of night sleep decreased during college days as compared to school days. The test also shows statistically significant (p<0.001) changes in number of students in which average duration of night sleep increased during lockdown as compared to that during college days [Table/Fig-7,8].

As compared to school days average duration of night sleep	Number of students (%)
Increased during college days	72 (9.5%)
Decreased during college days	436 (57.4%)
No change	252 (33.2%)
Total	760

[Table/Fig-7]: Distribution of change in sleep duration during college days as compared to school days.

(Wilcoxon signed-rank test Z=-14.564, p<0.001)

As compared to usual college days average duration of night sleep	Number of students (%)
Increased during lockdown	555 (73.0%)
Decreased during lockdown	31 (4.1%)
No change	174 (22.9%)
Total	760

[Table/Fig-8]: Distribution of change in sleep duration during lockdown as compared to college days.

(Wilcoxon signed-rank test Z=-19.837, p<0.001)

There was increase in percentage of students who reported satisfaction with sleep quality during lockdown as compared to the college days [Table/Fig-9]. There was significant (p<0.01) association between perception of adequate sleep by students during college days as compared to school days and during lockdown period as compared to college days. It can be observed from the [Table/Fig-10] that 698 (91.8%) students reported that they are able to take adequate sleep at home during lockdown period.

Satisfaction with sleep quality	During school days	During college days	During lockdown
Very dissatisfied	12 (1.6%)	37 (4.9%)	16 (2.1%)
Dissatisfied	56 (7.4%)	137 (18.0%)	50 (6.6%)
Neither satisfied nor dissatisfied	77 (10.1%)	229 (30.1%)	95 (12.5%)
Satisfied	479 (63.0%)	303 (39.9%)	313 (41.2%)
Very satisfied	136 (17.9%)	54 (7.1%)	286 (37.6%)
Total	760 (100%)	760 (100%)	760 (100%)

[Table/Fig-9]: Distribution of satisfaction with sleep quality.

Perception of students that they were able to sleep adequately	Yes	No	Total	χ^2 test
During school days	508 (66.8%)	252 (33.2%)	760 (100%)	
During college days	402 (52.9%)	358 (47.1%)	760 (100%)	34.942, (p-value <0.001)*
During lockdown	698 (91.8%)	62 (8.2%)	760 (100%)	7.341, (p-value <0.01)**

[Table/Fig-10]: Perception of adequate sleep by the students.

*Comparing school days with college days- χ^2 (1, N=760)=34.942, p<0.001 (significant);

**Comparing college days with lockdown period- χ^2 (1, N=760)=7.341, p<0.01 (significant)

DISCUSSION

In the present study, majority of the students were having morning lark type of sleep pattern during school days owing to prevailing morning time schedule of schools in India. In the present study, there was increase in the percentage of students that had night owl type of sleep pattern during college days as compared to school days. The change in bed time to a later time among medical students could be due to many reasons like academic pressure, spending more time on social media. The later sleep time in college going students has been reported previously in various studies [8,9]. In the present study, there was male preponderance of night owl type sleep pattern and female preponderance of morning lark type of sleep pattern during college days. This has been established by many researches that

females go to bed earlier than males [10-12].

Human sleep-wake cycle is affected by external cues like light and dark phase in a day; it is also influenced by physical activity, routine work, artificial light exposure during night, stress level of the individual [1]. These factors were altered during the situation of home confinement emerged during the lockdown period [13]. A study by Stanton R et al., reported reduction in physical activity among 48.9% participants and negative changes in sleep quality among 40.7% participants during COVID 19 pandemic [14]. López-Bueno R et al., in their study on COVID-19 confinement and health risk behaviours among adults above 18 years of age, observed sleep duration of less than 06 hours as health risk behaviour in 4.2% participants [15]. In the present study, the percentage of participants having sleep duration less than 6 hours during lockdown was 3.9%, although sleep duration less than 6 hours was not assessed as health risk behaviour.

In the present study, during school days 80.9% students were satisfied with the sleep quality (adding satisfied and very satisfied category) and during college days this percentage was 47%. Contrasting results of satisfaction with sleep quality among school students was obtained in a study by Chahine R et al., [16]. They reported that 76.5% students in their study were not satisfied with the sleep quality. A study by Eliasson AH et al., on sleep habits of college students reported satisfaction with sleep quality among 42% students which is slightly lower than the percentage of students satisfied with sleep quality in the present study [17]. There was reduction in percentage of students who had usual time to go to bed after mid night during lockdown as compared to college days.

To sustain optimal alertness throughout the day, sleep requirements varies with age [3]. The average sleep requirement is 8-9 hours in teen age years and 7-8 hours in adulthood [3]. The presents study findings suggest that during college days, a significant proportion of students were getting average sleep of less than 7 hours which was lower than the recommended sleep duration required for their age. The finding of the present study also suggests that home confinement has led to increase in average sleep duration in significant number of students. The percentage of students who think that during lockdown they are able to get adequate sleep was approximately 92%.

Limitation(s)

Some of the items were responded by the students based on their recall ability. The individual morningness or eveningness was also judged by the responders, it could have been decided by Horne and Ostberg "morningness-eveningness" questionnaire. The sleep quality was recorded on Likert's scale instead of Pittsburgh sleep quality index questionnaire.

CONCLUSION(S)

In majority of the participants, sleep pattern changed to night owl type during college days from morning lark type during school days. The home confinement in lockdown period due to global viral pandemic has positively impacted sleep of students in terms of bed time, satisfaction with sleep quality and quantity. The students must be made aware of need of adequate sleep for their health and academic benefits.

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PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Physiology, NSCB Medical College, Jabalpur, Madhya Pradesh, India.
2. Associate Professor, Department of Physiology, Gandhi Medical College, Bhopal, Madhya Pradesh, India.
3. Associate Professor, Department of Physiology, Bundelkhand Medical College, Sagour, Madhya Pradesh, India.
4. Associate Professor, Department of Biochemistry, NSCB Medical College, Jabalpur, Madhya Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Jaidev Singh,
House No. 34B, Jasuja City, Phase 01, Jabalpur, Madhya Pradesh, India.
E-mail: jsingh.gmc@gmail.com

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