

## Original article

### Sleep Pattern of Undergraduate Medical Students of the selected Medical Colleges in Dhaka during COVID-19 Pandemic: An Online Survey

Mostarin S<sup>1</sup>, Haque A<sup>2</sup>, Alam MR<sup>3</sup>, Choudhury R<sup>4</sup>, Nurunnabi M<sup>5</sup>, Sultana H<sup>6</sup>, \*Abbas MG<sup>7</sup>

#### Abstract

**Background:** Maintaining a regular sleep pattern helps to preserve the timing of the body's internal clock and can aid in having a healthy lifestyle. Medical students are a general population sub-group that is more vulnerable to poor sleep quality.

**Method:** A online based cross sectional study conducted to find out the sleep pattern of 264 undergraduate medical students during COVID-19 pandemic situation by using a pre-tested semi-structured questionnaire with Pittsburgh Sleep Quality Index (PSQI) scale.

**Results:** Medical students spent up to 9 hours in digital media (mean 5.1±2.7 hours) per day. Maximum students had gone to bed within 10.01pm- 12am but woke up later while 40.2% of students had severe sleep latency and 32.3% students missed their breakfast due to sleep. Mean sleep duration at night was 6.5±1.3 hours but 64.4% of them had poor sleep quality. There 18.9% students had very low habitual sleep efficiency, 28.4% took daytime nap ≥60 minutes regularly, 68.9% students faced daytime dysfunction. Statistically significant associations was found between BMI, physical exercise, smoking, tea/coffee consumption, taking drugs for stress/recreation, wake-up time and different sleep related variables like sleep duration, sleep latency, sleep efficiency, sleep quality (p < 0.05).

**Conclusion:** These results demonstrate that, insufficient sleep and unsatisfactory sleep-wake pattern have been documented among medical students.

**Key words:** Sleep pattern, medical students, Pittsburgh Sleep Quality Index, sleep duration, COVID-19 pandemic.

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#### Introduction

Adequate sleep consistency is a need for the optimal functioning of the brain and body.<sup>1</sup> Medical students endure a long and rigorous academic year and they may not regard sleep as a top priority in the light of their academic demands, as they limit their sleep time to additional hours for study and workload. They are prone to sleep deprivation and unhealthy sleep pattern.<sup>2</sup>

Over the last decade, there has been a significant increase in the uses of computers, social media as well as the proliferation of audio and video devices and late-night video-gaming zones among individuals.<sup>3</sup> The rise of digital media has altered the lifestyle of young adults, particularly undergraduates.<sup>4</sup> Because of these cultural shifts, young people's sleeping cycles tend to be irregular, and many of them suffer from sleep deprivation, which

#### Author's affiliation

1. Somaya Mostarin, MPH Fellow, Department of Health Education, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Email: somayamostarinmona@gmail.com
2. Aysha Haque, Lecturer, Department of Health Education, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Email: dr.aysha72@gmail.com
3. Mohammad Rashidul Alam, Assistant Professor (Community Medicine), Department of Health Education, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Email: rashidulalam330@gmail.com
4. Razaat Choudhury, Assistant Professor (Microbiology)  
National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Email: rafaatnila@gmail.com
5. Mohammad Nurunnabi, Assistant Professor, Department of Community Medicine, Sylhet Women's Medical College, Sylhet 3100, Bangladesh. Email: nur.somch@gmail.com
6. Hafiza Sultana, Professor and Head, Department of Health Education, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Email: sultanahafiza05@gmail.com
7. \*Md Golam Abbas, PhD, Assistant Professor, Department of Occupational and Environmental Health (OEH), National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka 1212, Bangladesh. Mobile No: +8801923476766. Email: abbasgolam@yahoo.com

**\*Address of Correspondence: \*Dr. Md Golam Abbas, PhD,** Assistant Professor, National Institute of Preventive and Social Medicine (NIPSOM), Mobile No: +8801923476766. Email: abbasgolam@yahoo.com

may have a detrimental influence on daytime activities, particularly study.<sup>5</sup>

Various studies reported that between 43.0% and 88.0% of students of medical science suffer from poor sleep quality which is alarming.<sup>6-8</sup> Moreover current COVID-19 situation may produce a negative influence on their sleep pattern. Following the educational institution shutdown, colleges' schedule has been changed. This schedule was different from the traditional college day and aimed at integrating online schooling and self-employed jobs.<sup>9</sup> Home confinement may decrease the amount of physical activity and daylight exposure and raise the degree of stress due to social alienation and the difficulty of engaging in adequate exercise with extensive use of social media.<sup>10</sup> These shifts have an effect on the pace of time flow and interrupt the night-time of sleep.<sup>11</sup> One study in Italy, identified the proportion of poor sleepers increased from 40.5% (before lockdown) to 52% (during lockdown).<sup>12</sup>

There is a lack of studies addressing sleep pattern of students in Bangladesh. The major underlying cause of many sleep problems is an insufficient information and ignorance. This study examined medical students' sleep patterns and quality when they were not subjected to an imposed wake-up time during COVID-19 pandemic. The outcomes of this study will help researchers in uncovering the underlying causes of sleep disorders and lowering the cost burden of non-communicable diseases related to sleep. This will help to understand the necessity for developing interventions and education strategies aiming the promotion of good sleep pattern of students.

## Methodology

A cross sectional study was conducted to find out sleep pattern during COVID-19 pandemic among purposively selected 264 undergraduate medical students of 3<sup>rd</sup> & 4<sup>th</sup> year from Sir Salimullah Medical College and Dhaka Medical College, Dhaka, Bangladesh. This online survey included the Pittsburgh Sleep Quality Index (PSQI) which differentiates between 'poor' and 'good' sleepers by measuring the areas: sleep duration, sleep disturbance, sleep latency, daytime dysfunction, habitual sleep efficiency, subjective sleep quality, use of sleeping medication over the past month. Scoring was based on 0-3 Likert scale, where a score of 0 means very mild or no difficulty/disturbance and 3 reflects the severe negative extreme. Global PSQI score 0-5 indicates good and 5-21 indicates poor sleep quality. Data were collected by a pretested semi-structured questionnaire through different online platforms such as Email, Google form during the study period of January to December 2020. The data were checked and cleaned followed by categorizing data, coded and post codes into IBM SPSS v20. The analysis was carried out by using both descriptive and inferential statistics and presented with tables and charts.

## Ethical approval

Ethical approval was obtained from the Institutional Review Board (IRB) of National Institute of Preventive and Social Medicine (NIPSOM), Dhaka 1212, Bangladesh. (Memo: NIPSOM/IRB/2020/1225)

## Results

There 264 participants ranged in age from 20 to 25 years (mean 22.2±1.4 years). There were more female respondents (59.1%) than male respondents (40.9%). Most of them lived in urban areas (73.9%) and belong to nuclear family (83.0%). House head earning member of maximum medical students were service holder (52.3%).

**Table 1: Lifestyle related factors (n=264)**

		n	%
Time (in hour) spent on digital media per day	≤3 hours	66	25.0
	4-6 hours	126	47.7
	≥7 hours	72	27.3
BMI	Underweight	21	8.0
	Normal weight	152	57.6
	Pre-obese	79	29.9
	Class I obesity	12	4.5
Time spent in physical exercise per day	≥30 minutes	40	15.2
	<30 minutes	27	10.2
	Irregular	51	19.3
	No exercise	146	55.3
Consumption of tea or coffee per day	Didn't take	71	26.9
	1-2 cups per day	156	59.1
	≥3 cups per day	37	14.0
Consumption of tea or coffee at late night	Yes	111	42.0
	No	82	31.1
Smoking	Yes	54	20.5
	No	210	79.5
Daytime naps per day	≥60 minutes	75	28.4
	<60 minutes	86	32.6
	Irregularly	38	14.4
	No naps	65	24.6
Affected by Corona virus	Yes	30	11.4
	No	234	88.6

The range of time spent in digital media varied from 1 to 9 hours (mean 5.1±2.4 hours) per day. Among the participants 93.2% said they never took drugs for anxiety/ depression/ stress/ recreation. There 6 participants said that they had lost their family member due to COVID-19 and 56 participants said that they lost their tuition or part time job during COVID-19 pandemic. There 40.2% students couldn't fall asleep within 1 hour after going to bed. Mean sleep duration of the respondents per night was 6.5 (±1.3 SD) hours. There 49.2% respondents didn't feel refreshed after awakening in the morning.

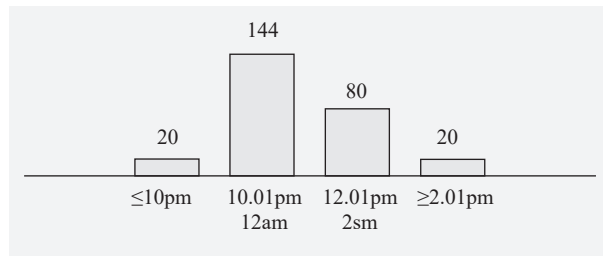


Figure 1: Respondents' bed time (n=264)

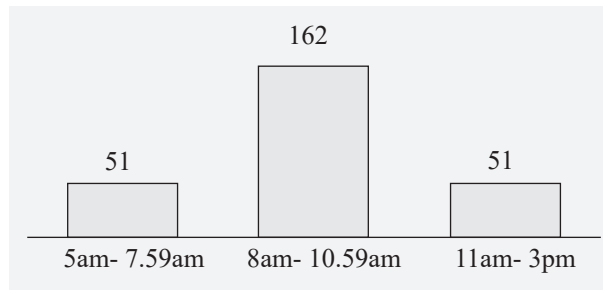


Figure 2: Respondent's wake-up time (n=264)

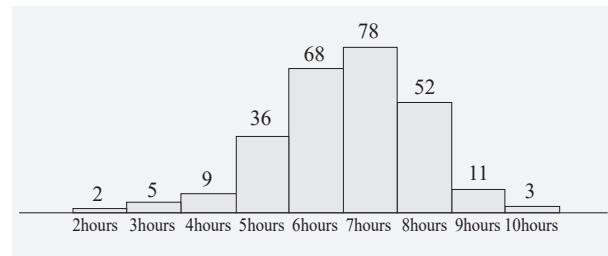


Figure 3: Respondent's sleep duration (n=264)

There 7.6% respondents experienced bad dream, 3.4% felt too cold, 14.4% had to get up to use bathroom, 14.8% woke up in the middle of night or early in the morning thrice or more than thrice per week in the last month and faced severe difficulty. Participants ranged in Global PSQI score from 0 to 19; among them 94 participants (35.6%) had good sleep quality (Global PSQI score: 0-5) and 170 (64.4%) had poor sleep quality (Global PSQI score: 6-21). Among the participants 14 (5.3%) said their sleep quality was very good, and 102 (38.6%) said that their sleep quality was fairly good but calculated sleep quality (by PSQI) was poor.

Table 2: Sleep quality related factors of the respondents (n=264)

	Very mild (Score: 0) n (%)	Mild (Score: 1) n (%)	Moderate (Score: 2) n (%)	Severe (Score: 3) n (%)
Sleep latency	35 (13.3)	72 (27.3)	51 (19.3)	106 (40.2)
Sleep disturbance	63 (23.9)	169 (64.0)	32 (12.1)	0 (0.0)
Daytime dysfunction	82 (31.1)	106 (40.2)	52 (19.7)	24 (9.1)
Habitual sleep efficiency	High efficiency (Score: 0) n (%) 114 (43.2)	Medium (Score: 1) n (%) 64 (24.2)	Low (Score: 2) n (%) 36 (13.6)	Very low (Score: 3) n (%) 50 (18.9)
Use of sleeping medication	Not during past month n (%) 238 (90.2)	<1 time in a week n (%) 18 (6.8)	1/2 times in a week n (%) 7 (2.7)	≥3 times in a week n (%) 1 (0.4)

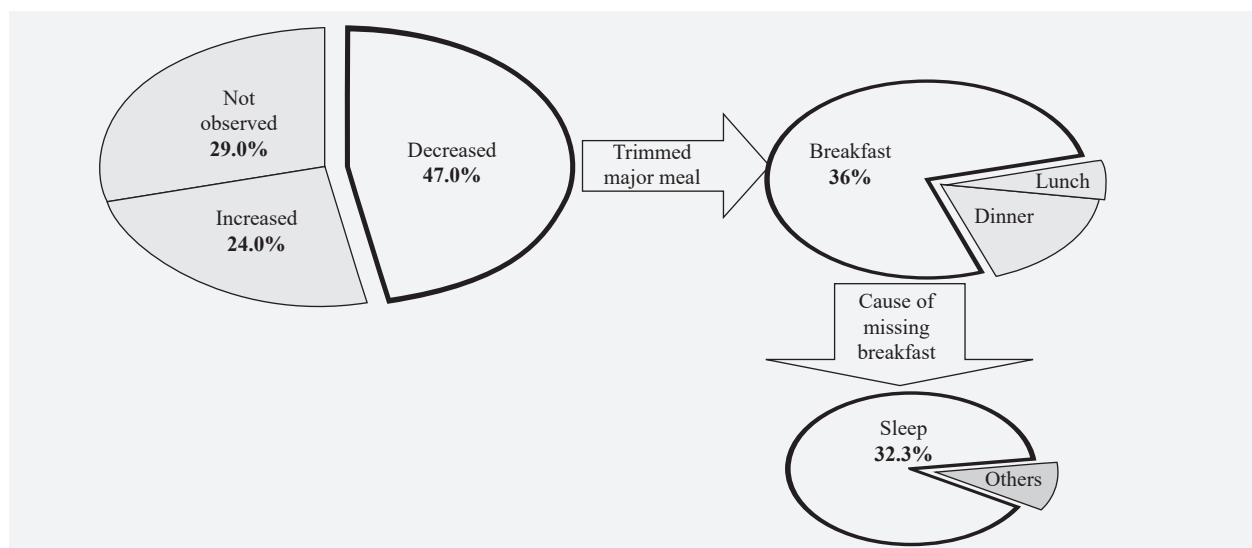


Figure 4: Respondents' opinions on changes in major meal number during the COVID-19 pandemic (n=264)

There 47.0% respondents said that the number of their major meal had been decreased. Among those 47.0% respondents 36.0% missed their breakfast. Major cause of missing breakfast was sleep/ late wakeup time (32.3%).

**Table 3: Association of sleep duration with different variables**

		Frequency	Sleep duration (in hours)	t/F	p-value
			Mean ( $\pm$ SD)		
<b>Gender</b>	Male	108	6.3 ( $\pm$ 1.3)	t= -2.706	0.007*
	Female	156	6.8 ( $\pm$ 1.4)		
<b>Area of resident</b>	Rural	69	6.4 ( $\pm$ 1.3)	t= -2.530	0.013*
	Urban	195	6.9 ( $\pm$ 1.4)		
<b>Time spent on digital media</b>	$\leq$ 3 hours	66	6.9 ( $\pm$ 1.3)	F= 0.227	0.797
	4-6 hours	126	6.7 ( $\pm$ 1.3)		
	$\geq$ 7 hours	72	6.8 ( $\pm$ 1.5)		
<b>BMI</b>	Underweight	21	7.2 ( $\pm$ 1.4)	F= 3.464	0.017*
	Normal weight	152	6.9 ( $\pm$ 1.3)		
	Pre-obesity	79	6.7 ( $\pm$ 1.4)		
	Obesity class I	12	5.8 ( $\pm$ 1.8)		

\*Statistically significant

**Table 4: Association of sleep latency with different variables**

	Very mild n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Total n (%)	$\chi^2$	p-value
<b>Hours spent on digital media (per day)</b>							
$\leq$ 3 hours	10 (15.2)	26 (39.4)	11 (16.7)	19 (28.8)	66 (100)	14.611	0.024*
4-6 hours	14 (11.1)	29 (23.0)	32 (25.4)	51 (40.5)	126 (100)		
$\geq$ 7 hours	11 (15.3)	17 (23.6)	8 (11.1)	36 (50.0)	72 (100)		
<b>Physical exercise (per day)</b>							
$\geq$ 30 mins	5 (12.5)	17 (42.5)	7 (17.5)	11 (27.5)	40 (100)	17.611	0.040*
<30 mins	5 (18.5)	8 (29.6)	7 (25.9)	7 (25.9)	27 (100)		
Irregular	12 (23.5)	13 (25.5)	7 (13.7)	19 (37.3)	51 (100)		
No exercise	13 (8.9)	34 (23.3)	30 (20.5)	69 (47.3)	146 (100)		
<b>Taking tea/coffee (per day)</b>							
1-2 cups	18 (11.5)	42 (26.9)	28 (17.9)	68 (43.6)	156 (100)	14.273	0.027*
$\geq$ 3 cups	2 (5.4)	6 (16.2)	10 (27.0)	19 (51.4)	37 (100)		
Didn't take	15 (21.1)	24 (33.8)	13 (18.3)	19 (26.8)	71 (100)		
<b>Smoking</b>							
Yes	5 (9.3)	17 (31.5)	12 (22.2)	20 (37.0)	54 (100)	1.720	0.663
No	30 (14.3)	55 (26.2)	39 (18.6)	86 (41.0)	210 (100)		
<b>COVID-19 disease</b>							
Yes	2 (6.7)	7 (23.3)	4 (13.3)	17 (56.7)	30 (100)	4.228	0.238
No	33 (14.1)	65 (27.8)	47 (20.1)	89 (38.0)	234 (100)		

\*Statistically significant

Statistically significant associations were found between sleep quality and BMI, physical exercise, smoking, tea/coffee consumption, taking drugs for stress/recreation, wake-up time. There was a significant association was found between COVID-19 disease and feeling after awakening in the morning was found.

**Table 5: Association of sleep efficiency with different variables**

	High n (%)	Medium n (%)	Low n (%)	Very low n (%)	Total n (%)	$\chi^2$	p-value
<b>Type of family</b>							
Nuclear	96 (43.8)	56 (25.6)	32 (14.6)	35 (16.0)	219 (100)	7.893	0.048*
Joint	18 (40.0)	8 (17.8)	4 (8.9)	15 (33.3)	45 (100)		
<b>Taking drugs for anxiety/ depression /stress/ recreation</b>							
Often	0 (0.0)	0 (0.0)	2 (66.7)	1 (33.3)	3 (100)	14.214°	0.006*
Sometimes	2 (13.3)	5 (33.3)	2 (13.3)	6 (40.0)	15 (100)		
Never	112 (45.5)	59 (24.0)	32 (13.0)	43 (17.5)	246 (100)		
<b>Wake-up time</b>							
5am -7.59am	36 (70.6)	13 (25.5)	2 (3.9)	0(0.0)	51 (100)	42.246	0.001*
8am-10.59am	67 (41.4)	39 (24.1)	27 (16.7)	29(17.9)	162 (100)		
11am - 3pm	11 (21.6)	12 (23.5)	7 (13.7)	21(41.2)	51 (100)		
<b>Bed time</b>							
Before 10pm	9 (47.4)	4 (21.1)	3 (15.8)	3 (15.8)	19 (100)	10.491°	0.322
10.01am-12am	52 (36.1)	36 (25.0)	26 (18.1)	30 (20.8)	144 (100)		
12.01am-2am	41 (51.2)	20 (25.0)	6 (7.5)	13 (16.2)	80 (100)		
After 2am	12 (57.1)	4 (19.0)	1 (4.8)	4 (19.0)	21 (100)		
<b>Take tea/coffee at late night</b>							
Yes	48 (43.2)	19 (17.1)	12 (10.8)	32 (28.8)	111 (100)	17.716	0.001*
No	29 (35.4)	28 (34.1)	17 (20.7)	8 (9.8)	82 (100)		

°Fisher's Exact Test; \*Statistically significant

## Discussion

Most of the students' were resided from urban area (73.9%) in this study. A study in Lahore was reported that two-thirds of their respondents were from urban background.<sup>13</sup> Cause of maximum respondents were from urban area in this study may be due to urban people were most responsive to an online interview.

This study showed that there was a difference in mean duration of sleep among different time bounded groups of digital media users but the difference was not statistically significant. The increase in time spent in digital media associated with duration of sleep during COVID-19 pandemic in Italy which is different from this study.<sup>12</sup> The same study in Italy showed an association between sleep latency and time spent in digital media which is similar to this study.<sup>12</sup> Most of the students had normal BMI (23.2±3.4). There 68% participants had normal BMI.<sup>3</sup> Another study in Kolkata found that, 70.7% were of normal BMI and BMI was significantly associated with global PSQI score as like this study.<sup>14</sup>

A statistically significant association between physical exercise and sleep quality which is similar to a study of Spain.<sup>4</sup> Another study also found an association between consumption of tea and sleep quality like this study.<sup>14</sup> A study in America didn't found any association between caffeine intakes and sleep quality.<sup>15</sup> It was observed that smoking could influence sleep quality. Smokers' experienced a reduction in sleep quality in respect to

nonsmokers.<sup>16</sup> Students who are smokers are 76.0% less likely to have a good sleep quality than non-smoker students in Bangladesh which is similar to this study.<sup>17</sup> A study in America also found an association between using recreational drug and sleep quality like this study.<sup>15</sup>

Major cause of missing breakfast was sleep/ late wakeup time (32.3%). Missing breakfast, a delayed breakfast time and lunch time due to sleep during lockdown reported by a study in India.<sup>18</sup>

Most of the participants can't sleep within 60 minutes in this study. A study in Ghana reported that most of the students fall asleep within 30mins.<sup>19</sup> Approximately 31.0% of the students indicated that they were unable to fall asleep within 30 min at least once per week.<sup>20</sup> There a positive relationship was found between gender and sleep duration which is similar to this study.<sup>16</sup> There 10 (6.5%) students went to bed before 10pm, 101 (66.0%) went to bed between 10pm and midnight and 42 (27.5%) went to bed after midnight.<sup>19</sup> Like this study, The most common cause of nighttime sleep disruption was found to be waking up to use the toilet in another study.<sup>19</sup> The average duration of sleep reported by respondents was 5.7±1.2 hours which is less than this study.<sup>19</sup> The mean total sleep time 7.2±1.1 hours which is more than this study.<sup>15</sup> There 58.4% of the total students were poor sleepers, whereas 41.6% were good sleepers.<sup>20</sup> There 69.5% students have poor sleep quality among the participants in Bangladesh which is very close to this study.<sup>17</sup>



## Conclusion

Majority of undergraduate medical students had unsatisfactory sleep pattern during COVID-19 pandemic. They had gone to bed early but take a long time to sleep and woke up later with severe sleep latency. Sleep duration was average and associated with gender and taking tea/coffee at late night. Many students regularly skipped their breakfast during pandemic due to late wakeup time. Sleep related variables like sleep quality, sleep latency, habitual sleep efficiency, sleep duration were associated with gender, area of residence, BMI, physical exercise, tea/caffeine intake, smoking habit, use of drug for anxiety/depression/stress/recreation and wake-up time. Medical students affected by Corona virus didn't feel refresh after awakening in the morning. In order to increase the sleep quality of them, more support should be given. This can be achieved by opening up therapy centers and encouraging them to maintain normal sleep pattern, which can help them creating a positive difference in their sleep-wake cycle and coping with their new normal lifestyle.

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