

Prevalence of sleep Quality and daytime Sleepiness among medical student in association with stress, anxiety, depression after Covid 19 Pandemic lockdown in South India: A Cross sectional study

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Abstract:

Objectives: The purpose of this study is to investigate the prevalence and relationships between stress, anxiety, and depression and daytime sleepiness among medical students in the Erode area of Tamil Nadu. **Methods:** Using a stratified random sample technique, a cross-sectional research of 288 Government Erode Medical College medical students was conducted. The survey was self-administered electronically. The daytime sleepiness, sleep quality, and stress, depression, and anxiety were evaluated by the Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index (PSQI), and DASS 42, respectively. **Results:** Overall, 22.6% of students reported excessive daytime sleepiness. Depression, anxiety, and stress all had prevalence rates of 40.6%, 39.9%, and 29.9%, respectively. 78.5% of people reported having undesirable or poor sleep quality (total PSQI score 5). Epworth Sleepiness Scale Grade and DASS Levels are not correlated ($P > 0.05$). The findings show that women are substantially more stressed than men are ($P < 0.05$). Stress and poor sleep quality were substantially correlated ($P < 0.05$), indicating that stress level is a significant predictor of poor sleep quality. The study's findings show that students have a high level of stress and poor sleep quality, and they are strongly correlated. We advise creating classes that instruct students on good sleeping habits and coping mechanisms for stressful situations.

Medical students were reported to have a significant prevalence of night-time sleepiness and excessive daytime sleepiness. Overuse of mobile devices was found to be causally related to both excessive daytime

sleepiness and poor sleep quality. When compared to students who get low quality sleep, the former performed better academically. Those who had low quality sleep showed an escalating pattern of excessive daytime drowsiness. There was a high prevalence of sleep problems, anxiety, stress, and depression among pre-clinical medical students. Those medical students who struggled with their academic performances, poor lifestyle factors, and poor Social and COVID management had significantly higher levels of sleeping disorders, anxiety, stress, and depression.

Keywords: daytime sleepiness, Depression, anxiety, stress, sleep quality

Introduction:

The novel coronavirus disease in December 2019 (COVID-19), which originated in Wuhan, China, spread around the world, forcing the World Health Organization to recognize this unanticipated health emergency as a global pandemic on March 11, 2020[1]. The difference between current COVID-19 with that of previous coronavirus rarely produces runny noses or GIT problems in those infected, which are unexceptional in severe acute respiratory syndrome (SARS)[2]. SARS-CoV-2 is causative of severe viral pneumonia, affecting more than 120 million people in 220 countries and 2.66 million deaths as of March 16, 2021[3]. Due to the rigorous academic standards and demanding professionals, the medical fields are thought to be a stressful subject of study. This has a negative impact on the students' mental and physical health. [4,5]. This condition is a result of a number of circumstances, including the academic overload, nighttime on-call responsibilities, exposure to illnesses and fatalities, frequent exams, and extensive curriculum. [6-9] Additionally, many students are dealing with a variety of stressors outside of their medical school, including family, social, emotional, and physical issues. [10,11].

Currently, stress, anxiety, and depression among medical students are significant global health issues. To equip themselves to handle ongoing professional challenges, medical students must acquire the necessary information, abilities, and attitudes. However, the rigours of learning and education can have a severe impact on students' physical and mental well-being. Medical students experience despair, anxiety, and stress as a result of this scenario, and they are more likely than the general population to experience psychological distress[12,13].

There is a lot of evidence to back up the idea that stress is becoming more common among medical students. Medical students in Canada and the United States experience higher rates of suicide ideation, despair, and psychological distress than the general population, according to a systemic evaluation conducted in 2006. [14] In Nepalese, Malaysian, and Pakistanese medical students, the prevalence of stress was recorded at 20.9%, 41.9%, and 90%, respectively. [15-17]. Psychological stress may have negative impacts on students' functioning in the classroom and in therapeutic settings, as well as cognitive deficiencies, disease, a higher risk of developing anxiety and depression, and a lower quality of life. [18-20] High levels of stress were also associated with poor health habits; these students were more likely to overindulge in junk food, be inactive more often, and sleep poorly. Stress consequently cost pupils in terms of physical, mental, behavioural, and academic problems. [19].

Medical students may experience depression, anxiety, and stress formation for a variety of reasons. These elements are categorised as academic and non-academic stressors (psychosocial and sociodemographic). [21-22] These elements include a thorough medical curriculum, lengthy course durations, worries about academic success, strong expectations from families, and sociodemographic traits. These stressors have been linked to psychiatric diseases, poor sleep, low academic performance, alcohol and drug abuse, loss of confidence, poor life quality, and sadness, anxiety, and stress. [23-26].

The quantitative and qualitative elements of sleep can both be used to describe sleep quality. The qualitative component, which is a self-reported measurement of the depth and sense of restfulness upon awakening, is

separate from the quantitative component, which includes the length of sleep. [27] Reduced sleep quantity and quality have negative effects on health, leading to an increase in morbidity and mortality. [28] Sleep issues can lead to problems in the mental, emotional, physical, social, academic, and professional spheres of life.

In comparison to those who do not experience any subjective weariness or recognised sleep disorders, excessive and uncontrolled sleepiness is significantly linked to occupational accidents, employment terminations,[29,30] and nearly seven times as many traffic accidents.

Medical students are prone to having poor-quality sleep. Worldwide, 19–90% of medical students reported having sleep issues [4]. Students who have poor sleep habits do poorly in school and have trouble focusing and paying attention [31]. The performance of medical students [32] and their future work performance as practitioners may be impacted by poor sleep quality and excessive daytime sleepiness (EDS), which may also have an impact on the healthcare system.

Material and Methods:

Study design and setting:

A cross-sectional study was done at Government Erode medical college during the academic year 2018 among medical students from the first to the final academic year. Students who have a history of psychiatric problems were excluded.

Sample size and sampling procedure:

Using the Raosoft sample size calculator, it was determined that 288 individuals would provide a sample size with a 95% confidence level and a 5% margin of error. A stratified random sampling strategy was applied. First, a stratum was created based on the percentage of students in each academic year. Then, at random, request that both the male and female sections of students complete the questionnaire.

Data collection instruments:

This cross-sectional study was conducted via online survey among 288 medical students aged between 18 and 22 years during the period June–July 2022. After obtaining online consent, we collected data assessing students' sociodemographic details, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index (PSQI) and DASS scales of self-explained questionnaires. The Google Form online questionnaire was sent to the students via an online platform. Students pursuing MBBS in the Erode region of Tamilnadu were contacted via WhatsApp and E-mail and interviewed after receiving permission from their respective college.

Study tool:

Pittsburgh sleep quality index: PSQI is a self-administered questionnaire[33] that may be used in both nonclinical and clinical settings to measure subjective sleep quality. Scores higher than 5 indicate poor sleep. We gathered data from the PSQI on how many hours participants spent in bed (TIB; min) and sleeping (TST; min) when they went to bed to sleep (BT; hr), and when they woke up in the morning (WU; hr) throughout the second wave of COVID-19, as well as changes in sleep pattern.

Epworth sleepiness scale: Daytime sleepiness, which interferes with daily activities, is termed EDS and it is measured by the ESS, a self-administered questionnaire with eight questions. Respondents are asked to rate, on a 4-point Likert scale (0–3), their usual chances of dozing off, or falling asleep while engaged in eight different activities. The ESS score (the sum of 8 item scores) can range from 0 to 24. The higher the ESS score, the higher that person's average "daytime sleepiness." The scale has good reliability and internal consistency (Cronbach's alpha of 0.82).[34]

Depression, Anxiety and Stress Scale (DASS-42): DASS-42 is a scale developed by Lovibond, P. and Lovibond, S[35] to determine individual's levels of depression, anxiety, and stress. The scale consists of

totally 42 items including three dimensions with 14 items about depression, 14 items about anxiety, and 14 item about stress. Depression items measure dissatisfaction, despair and worthlessness, loss of interest, and low energy levels. Anxiety items assess the individual's autonomic arousal, situational anxiety, subjective anxiety, and muscle response level. Stress items measure the level of symptoms of relaxation difficulty, nervous stimulation, quick worry and press, discomfort, overreaction, and intolerance

Statistical analysis:

The survey results of the questionnaire were extracted and recoded using MS Excel and then imported and analyzed using SPSS version 25 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. IBM Corp.). Univariate descriptive analysis such as frequency and the percentage was done for sociodemographic and categorical (nominal and ordinal) demographic variables and dependent variables. Descriptive statistical measures were calculated for numeric scale variables. Reliability is the consistency of measurement or stability of measurement over a variety of conditions in which the same results should be obtained. Cronbach's Alpha is the measure to check the reliability of the questionnaire instrument. As per the survey-related research literature, the Cronbach Alpha value above 0.7 is acceptable. Reliability analysis was performed for the domain containing Likert scale items. The Epworth Sleepiness Scale contain 8 items and Cronbach's Alpha is 0.610, Pittsburgh Sleep Quality Index Scale contain 814 items and Cronbach's Alpha is 0.824, DASS 42 Scale contain 42 items and Cronbach's Alpha is 0.959. The reliability analysis reveals that for all domain items Cronbach's Alpha was >0.60.

Chi-squared test of association was used to study the significant associations between categorical sociodemographic variables versus categorical dependent variables. One-way analysis of variance (ANOVA) was used to compare the mean values of numeric variables with demographic variables containing more than two levels. Pearson correlations were used to examine the relationship between any numeric variables. When P value < 0.05 is considered statistically significant.

Ethics:

Ethical approval for the study was given by the Government Erode Medical College and Hospital, Perundurai, Erode Institutional Ethical Committee vide Reference number: IEC/001/GEMC& H/2020 Dated: 31.07.2020. Written digital consent was obtained from study participants prior to completing the survey form. Participants gave their consent by ticking the designated box. Personal identifiers such as names were not collected during the study.

Results:

There were 288 students were participated in the study. Among them, 91 (31.6%) were male and 197 (68.4%) were female. The mean age of males was 19.56 ± 1.57 years and that of females was 19.66 ± 1.29 years. The mean weight of the study participants was 57.46 ± 11.68 kgs. The mean height of the study participants was 1.64 ± 0.09 m. The mean Body Mass Index (BMI) of the study participants was 22.27 ± 3.82 kg/m².

The score of depression, anxiety, and stress when the scores were classified, 40.60%, 39.90%, 29.9% of the participants had depression, anxiety, and stress symptoms, respectively [Table 1]. Pearson correlation analysis reveal there was a significant relationship observed between depression versus anxiety ($r=0.779$) and depression versus stress ($r=0.816$; $P<0.05$). Pearson correlation analysis also reveal there was a significant relationship was observed between anxiety version stress ($r= 0.802$; $P<0.05$) [Table 2]. One way analysis of variance test results shows that the mean score of depression and anxiety with a year of the study did not vary significantly ($P>0.05$). There was a significant in mean stress with a year of study students ($P<0.05$). Year 3 and 4 students are showing higher mean stress scores compared to year 1 and 2 students. Inference: One way analysis of variance test results show that significantly mean score of depression, and

anxiety differ with family income ($P < 0.05$). However, there was no significant difference in the mean stress score of students with family income ($P > 0.05$).

Table-1: Frequency analysis of DASS (depression, anxiety, and stress) among medical students

Stress	Normal	Mild	Moderate	Severe	Extremely Severe
Depression	171 (59.4%)	34 (11.8%)	46 (16.0%)	25 (8.7%)	12 (4.2%)
Anxiety	173 (60.1%)	23 (8.0%)	43 (14.9%)	27 (9.4%)	22 (7.6%)
Stress	202 (70.1%)	36 (12.5%)	33 (11.5%)	12 (4.2%)	5 (1.7%)

Table 2: Relationship between depression, anxiety, and stress among medical students

DASS	Correlation	Depression Score	Anxiety Score
Anxiety Score	Pearson Correlation	.779**	
	P Value	0.000	
Stress Score	Pearson Correlation	.816**	.802**
	P Value	0.000	0.000

Table 3: PSQI score

PSQI Sleep quality	Frequency	Percent	Chi square	P Value
Desirable Sleep Quality	62	21.5	93.39	0.000
Undesirable Sleep Quality	226	78.5		
Total	288	100.0		

The study participants global PSQI is 6.33 ± 2.13 . Poor quality of sleep was reported in 226 (78.5%) study participants [Table 3 /Fig-1]. Proportion of poor sleep quality was reported higher among females (80.2%) compared to males (74.76%). Chi square goodness of fit test results show that significantly 21.5 % of the students are having desirable Sleep Quality and 78.5 % are Undesirable Sleep Quality ($P < 0.05$) [Table 3]. Excessive daytime sleepiness was found in 65 students (22.6%) [Table -4/Fig-2]. Chi-square goodness of fit test results show that significantly 77.4 % of the students are Non Excessive Day time Sleepiness and 22.6 % are Excessive Day time Sleepiness ($P < 0.05$) [Table-4]. There is no association observed between gender versus Epworth Sleepiness Scale Grade and PSQI Grade [Table-5].

Figure-1: Frequency analysis PSQI score

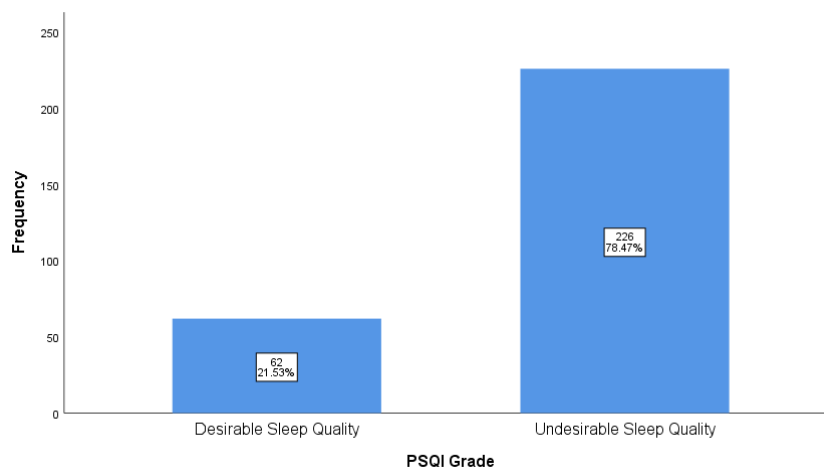
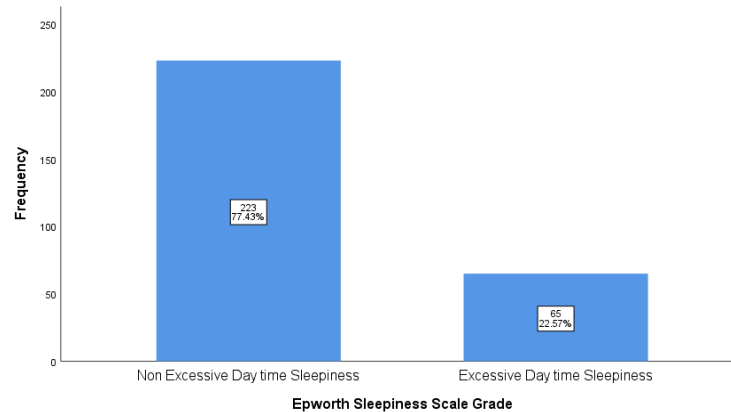


Table-4: Frequency analysis Epworth Sleepiness Scale Grade

Epworth Sleepiness	Frequency	Percent	Chi square	P Value
Non Excessive Day time Sleepiness	223	77.4	86.641	0.000
Excessive Day time Sleepiness	65	22.6		
Total	288	100.0		

Figure-2: Frequency analysis Epworth Sleepiness Scale score**Table-5: Frequency analysis on Epworth Sleepiness Scale Grade and PSQI Grade among male and female medical students**

		Male		Female		Chi-square	P Value
		Count	%	Count	%		
Epworth Sleepiness Scale Grade	Non Excessive Day time Sleepiness	76	83.5%	147	74.6%	2.82	0.093
	Excessive Day time Sleepiness	15	16.5%	50	25.4%		
PSQI Grade	Desirable Sleep Quality	23	25.3%	39	19.8%	1.106	0.293
	Undesirable Sleep Quality	68	74.7%	158	80.2%		

Table-6: Inter relationship between each variables

Domain	Male		Female		P Value
	Mean	Standard Deviation	Mean	Standard Deviation	
EPSS Total	7.30	3.99	7.72	4.04	>0.05
Global PSQI	6.29	2.17	6.36	2.12	>0.05
Depression Score	8.31	8.18	10.02	8.92	>0.05
Anxiety Score	6.69	6.97	8.33	7.07	>0.05
Stress Score	9.38	8.19	11.69	8.27	<0.05

The Inter relationship between each variable among medical students after Covid 19 pandemic lockdown with the demographic variables. The independent t-tests results reveal that there was no significant difference between males and females in all domain scores ($P > 0.05$) except for stress score ($P < 0.05$) [Table-6].

Table-7: Comparison of sleep quality among medical students

Sex	N	Mean	Std. Deviation	Std. Error Mean	t value	P Value
EPSS Total	Male	91	7.2967	3.98747	-0.822	0.412
	Female	197	7.7157	4.03687		
Global PSQI	Male	91	6.2857	2.16685	-0.258	0.797
	Female	197	6.3553	2.11545		

Table-8: Comparison of depression, anxiety, and stress among male and female medical students

DAS	Gender	N	Mean	Std. Deviation	Std. Error Mean	t test	P value
Depression Score	Male	91	8.3077	8.17543	0.85702	-1.554	0.121
	Female	197	10.0203	8.92483	0.63587		
Anxiety Score	Male	91	6.6923	6.97407	0.73108	-1.835	0.068
	Female	197	8.3299	7.07163	0.50383		
Stress Score	Male	91	9.3846	8.19454	0.85902	-2.207	0.028
	Female	197	11.6904	8.26602	0.58893		

Comparing of sleep quality among medical students No difference in the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index was observed between male and female students [Table-7]. Independent t test shows that there is no significant difference in Depression and anxiety sore scores between male and female students ($P>0.05$). There was a difference in stress scores between male and female students ($P<0.05$) [Table-8].

Association between the Epworth Sleepiness Scale Grade versus DASS Chi square test of association reveals that there is no association observed Epworth Sleepiness Scale Grade versus DASS levels ($P>0.05$). [Table-9]. Prevalence of stress, anxiety, and depression and sleep quality based on gender The chi square test of association reveals that there is no association between Gender and PSQI and Gender and DAS ($P>0.05$) [Table-10]. Independent t test results reveal that significantly female are more stressed compared to females ($P<0.05$).

Table-9: Association between the Epworth Sleepiness Scale Grade versus DASS

DASS	Categories	Epworth Sleepiness Scale Grade				Chi Square	P Value
		Non-Excessive Day time Sleepiness		Excessive Day time Sleepiness			
		Count	%	Count	%		
Depression	Normal	136	61.0%	35	53.8%	3.368	0.498
	Mild	27	12.1%	7	10.8%		
	Moderate	34	15.2%	12	18.5%		
	Severe	19	8.5%	6	9.2%		
	Extremely Severe	7	3.1%	5	7.7%		
Anxiety	Normal	136	61.0%	37	56.9%	0.941	0.919
	Mild	17	7.6%	6	9.2%		
	Moderate	32	14.3%	11	16.9%		
	Severe	20	9.0%	7	10.8%		
	Extremely Severe	18	8.1%	4	6.2%		
Stress	Normal	158	70.9%	44	67.7%	4.476	0.345
	Mild	27	12.1%	9	13.8%		
	Moderate	26	11.7%	7	10.8%		
	Severe	10	4.5%	2	3.1%		
	Extremely Severe	2	0.9%	3	4.6%		

Table-10: Prevalence of stress, anxiety, and depression and sleep quality based on gender

Domain	Categories	Male		Female		Chi Square	P Value
		Count	%	Count	%		
PSQI Grade	Desirable Sleep Quality	23	25.3%	39	19.8%	1.106	0.293
	Undesirable Sleep Quality	68	74.7%	158	80.2%		
Depression	Normal	61	67.0%	110	55.8%	7.979	0.092
	Mild	4	4.4%	30	15.2%		
	Moderate	13	14.3%	33	16.8%		
	Severe	9	9.9%	16	8.1%		
	Extremely Severe	4	4.4%	8	4.1%		
Anxiety	Normal	60	65.9%	113	57.4%	2.563	0.633
	Mild	7	7.7%	16	8.1%		
	Moderate	10	11.0%	33	16.8%		
	Severe	7	7.7%	20	10.2%		
	Extremely Severe	7	7.7%	15	7.6%		
Stress	Normal	67	73.6%	135	68.5%	1.386	.847
	Mild	9	9.9%	27	13.7%		
	Moderate	10	11.0%	23	11.7%		
	Severe	3	3.3%	9	4.6%		
	Extremely Severe	2	2.2%	3	1.5%		

Discussion:

Depression, anxiety, and stress are the most common psychiatric disorders in the society during Covid 19 lockdown. Depression among medical students is a worldwide phenomenon. Despite major changes in medical education, depression remains a major problem. In the present study, 78.5% of undergraduate medical students had poor sleep quality as per the PSQI scale which was higher than the findings of a study conducted in Nepal [36]. A higher prevalence of poor quality of sleep among medicos was reported by other studies [37-41]. However, many studies reported a higher proportion of poor quality of sleep among younger students <20 years.

Our studies The score of depression, anxiety, and stress when the scores were classified, 40.60%, 39.90%, 29.9% of the participants had depression, anxiety, and stress symptoms, respectively. These results showed that the prevalence of depression, anxiety, and stress is higher than the previous studies in Turkey.[42-43].

One of the most frequent causes of EDS and a regular finding in medical students is sleep deprivation. Approximately 45% of the participants in our study had a PSQI score of 5 or lower, 60% of the students slept for less than 7 hours, and 68% required more than 15 minutes to fall asleep after going to bed. The typical amount of sleep was less than the 8 hours for young adults that is considered healthy.] Our investigation confirmed the findings of a study conducted in north India, where it was shown that more than one-third of the participants had poor sleep. [44] Thus, the current study's replication of earlier findings

linking poor sleep quality to EDS in medical students further explored their links to a number of other variables.

The new study supports the growing prevalence of poor sleep quality among medical students, which has been found in earlier research. This conclusion could be explained by a number of variables, including the fact that medical students are involved in a variety of activities and are under a lot of stress, which may cause them to study at night. This study also supports the finding that a high stress level is strongly linked to poor sleep quality. It supports previous research from King Saud University and a Pakistani medical school indicating a high degree of stress is a strong predictor of poor sleep quality. [4] Psychological distress is seen as a sleep disruption trigger. [46] Physiological changes occur in reaction to stressors to aid the body in coping with the circumstance. [47].

The sympathetic-adrenal-medullary axis and the hypothalamic-pituitary-adrenal axis, which are all involved in the stress response, can be chronically activated, and this can result in the persistent production of cortisol and epinephrine, sometimes known as "stress hormones," in the body. The release of cortisol has a circadian cycle, which can be impacted by sleep loss. Because of this, it symbolises a vicious loop that harms the pupils' mental health.

A study carried out among Moroccan medical students, however, revealed no connection between excessive daytime sleepiness and the year of study [47]. In the current investigation, it was discovered that there was a statistically significant correlation between the proportion of excessive daytime sleepiness and the amount of time spent using a mobile phone. Due to their extensive use of cellphones and the internet, doctors have been found to be excessively sleepy during the day in other research. In the current study, there was no discernible link between daytime sleepiness and academic performance. A study carried out in Saudi Arabia and Morocco found similar results. The present investigation found a strong correlation between excessive daytime drowsiness and poor sleep quality, which was also found by Sathe HS et al., [48].

Limitation:

This was a cross-sectional study conducted only in one medical college which may limit the generalisability of the findings. Since the responses were collected using a self-administered questionnaire, there may be an information bias.

Conclusion:

The current study discovered a strong correlation between medical students' high incidence of stress and their poor sleep quality. Medical students experience poor sleep and ongoing stress, which can result in harmful behaviours like overindulging in junk food and a reduced likelihood of exercising. In this study, it was discovered that medical undergraduate students had a very high prevalence of poor sleep quality and excessive daytime sleepiness. Overuse of mobile devices was found to be causally related to both excessive daytime sleepiness and poor sleep quality. When compared to students who get low quality sleep, the former performed better academically. Those who had low quality sleep showed an escalating pattern of excessive daytime drowsiness. Studies on sleep quality are crucial for tracking students' sleep patterns and for helping to create treatments aimed at raising awareness of this problem. It is important to spread knowledge about how poor sleep quality affects academic achievement. we recommend providing adequate support and counseling, guidance, and mental health prevention programs for undergraduate students as part of their clinical rotations. Another longitudinal study could be conducted to identify the stress levels and quality of sleep among undergraduate students in the medical school and the associated factors.

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Declaration of interests:

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