

Sleep Hygiene Practices and Their Association with Sleep Quality Among Undergraduate College Students of a North Indian City: A Cross-Sectional Study

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Abstract:

Introduction: Sleep hygiene refers to behavioural and environmental practices that promote healthy and restorative sleep. **Objectives:** This study aimed to assess sleep hygiene practices and their association with sleep quality among undergraduate students in a North Indian city. **Methods:** A cross-sectional study was conducted among 600 randomly selected undergraduate students of four colleges. Sample size was calculated using formula $n = (Z^* \sigma / E)^2$, where σ is standard deviation and E is margin of error. Data were collected using a Google form having a semi-structured questionnaire, Sleep Hygiene Index (SHI), and Pittsburgh Sleep Quality Index (PSQI). Descriptive statistics, correlation analyses, and multiple linear regression were performed. **Results:** The mean age of participants was 20.51 ± 1.84 years and the proportion of female participants was 59.0%. The mean SHI score was 18.85 ± 7.57 among participants. Common poor practices included using the bed for non-sleep activities, irregular sleep-wake schedules, and pre-sleep worrying. A positive correlation was observed between SHI and PSQI scores ($r = 0.302$). Regression analysis identified female gender (aOR, 95% CI: 1.67 (0.32- 3.02, p value= 0.016), poor sleep quality [adjusted odds ratio (aOR), 95% confidence interval (CI): 2.69 (1.37- 4.02, p value<0.001], and higher non-academic screen time (aOR, 95% CI: 0.09 (0.002- 0.017), p value= 0.013) as predictors of poorer sleep hygiene. **Conclusion:** Poor sleep hygiene is strongly associated with impaired sleep quality. Targeted interventions focusing on reducing recreational screen use, promoting regular sleep routines, and stress management are essential to improve students' sleep health and well-being.

Keywords: Sleep hygiene, Sleep quality, Screen time

Introduction:

Sleep hygiene refers to a set of behavioural and environmental practices that are essential for promoting healthy, consistent, and high-quality sleep. Originally introduced as a treatment strategy for mild to moderate insomnia, sleep hygiene is now widely recognised as a

preventive approach for sleep-related problems across populations.^[1,2] Practicing good sleep hygiene supports the body's circadian rhythm and improves sleep initiation, continuity, and overall quality.^[3] Among college students, the transition to college life brings about increased academic responsibilities, autonomy in

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daily routines, and lifestyle changes.^[4,5] Poor sleep practices in students can negatively impact physical health, mental well-being, academic performance, and increase vulnerability to mood disorders such as anxiety and depression.^[6,7,8]

Most of the studies worldwide are focused on prevalence of sleep quality. Few studies assessing sleep practices using the Sleep Hygiene Index have reported that poor sleep hygiene is highly prevalent among university students. A study conducted in Qatar, reported poor sleep hygiene patterns in 79% of the university students.^[9] Other studies conducted in Ethiopia and Egypt among medical students reported poor sleep hygiene practices in 48.1% and 93.7% respectively.^[10,11] In the Indian context also, available studies are mostly limited to medical students reporting with nearly 47-75% of medical students demonstrating poor sleep hygiene practices.^[12,13]

Limited research has focused on sleep hygiene practices across a diverse undergraduate student population in India. Evaluating sleep hygiene practices and their association with sleep quality across various undergraduate streams is crucial to design appropriate interventions and promote better sleep health among students. This study aims to assess sleep hygiene practices and their association with sleep quality among undergraduate college students of a North Indian City.

MATERIAL AND METHODS

Study Design, and Study Setting:

This cross-sectional study was conducted from June 2023 to September 2023 among students enrolled in four different colleges in a North Indian city, viz. one government medical college, two government colleges with paramedical courses, and one private college offering other graduate courses [non-professional courses like B.A. (Bachelor of Arts), B.Com (Bachelor of Commerce), BCA (Bachelors in Computer Application), BSc (Bachelors in Science) etc. Students undergoing internships (MBBS and Physiotherapy), 4th year Nursing students and post-graduate degree were excluded from the study as they had different duty hours

than other undergraduate students (including night duties), and it might affect their normal sleep cycle.

Sample size :

The sample size was calculated by using the formula $n = (Z * \sigma / E)^2$ where n is the required sample size, Z is the standard normal variate corresponding to the desired confidence level (1.96 for 95% confidence), σ is the standard deviation of the Sleep Hygiene Index (SHI) score taken from study conducted by Seun-Fadipe et al (Mean $\pm$ Standard Deviation = 19.0 ± 6.31), E is the margin of error (2.8% of the mean value).^[14,15] Taking into consideration the rate of non-participation and incompletely filled questionnaire as 10%, the calculated sample size was 596. We decided to take the final sample size of 600 students (200 each from medical, paramedical and other graduate course students).

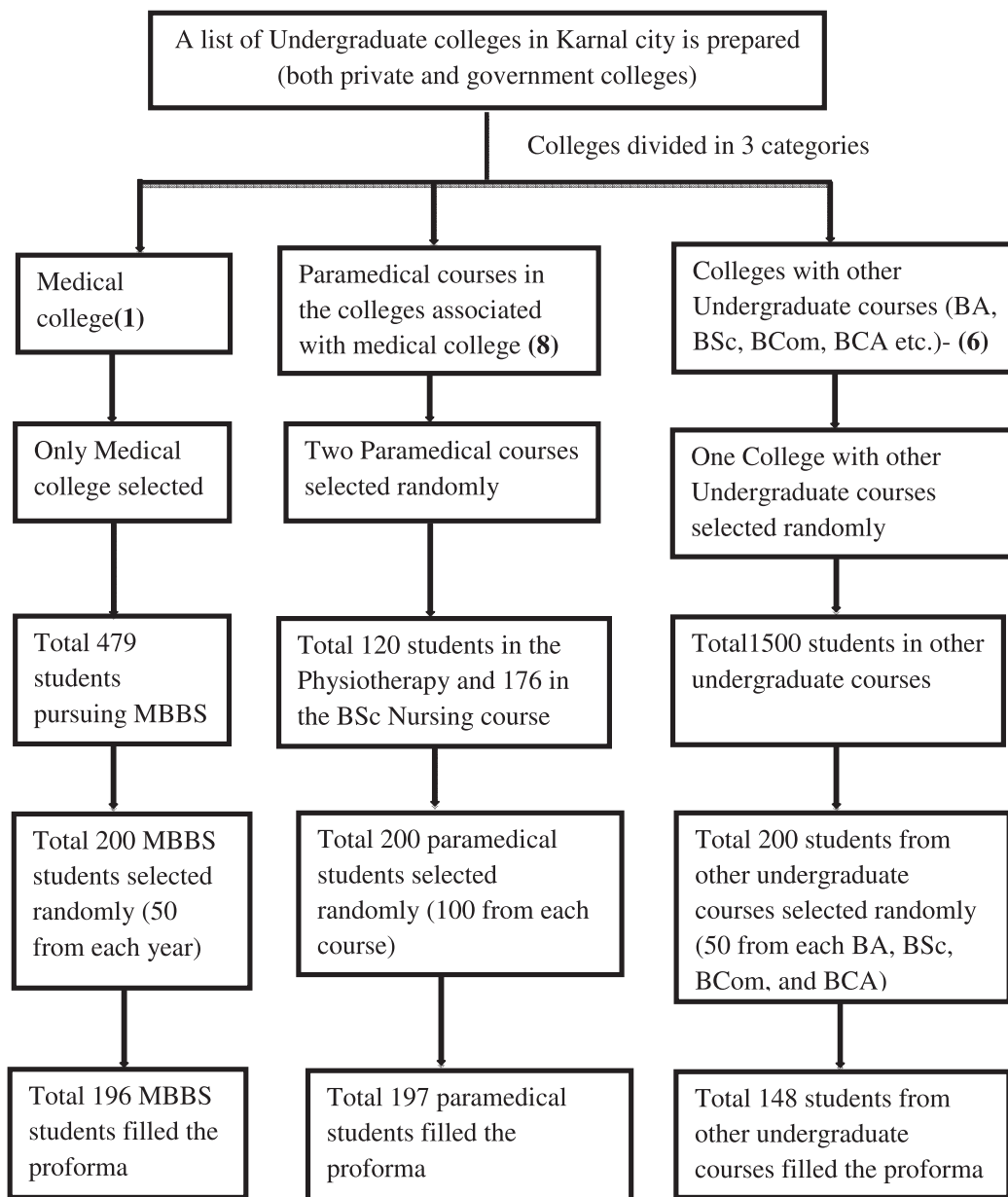
Sampling Strategy:

The details of sampling strategy are depicted in Figure 1 through the flow diagram. Of the three categories of colleges, one medical, two paramedical (as the students enrolled were less in paramedical courses) and one college offering other graduate courses were randomly selected. Further, stratified random sampling with equal allocation was used to select students from each college. A list of class roll numbers was used as the sampling frame and roll numbers of students were selected randomly by using a computer-generated random number table.

Data Collection

The students were contacted in their classroom to explain the study and its purpose. A Google form questionnaire and the randomly selected roll numbers list were shared with the students in their class WhatsApp groups. Before initiating the response to the questions in the Google form, we explained the purpose of the study, the confidentiality of the data, and the consent form. If the student consented, then only he/she could proceed to fill out the questionnaire. To safeguard and enhance their voluntariness, the email IDs of the students were not collected. In Google Forms, the Names

Figure 1. Flow diagram showing selection of study participants



and Roll numbers of the students were not included in the questionnaire to maintain anonymity.

Data Collection Tools

A semi-structured questionnaire was used to collect data on the demographic details of students, screen time, and any substance abuse. To validate this questionnaire, a pilot study was conducted among ten students, and any necessary modifications were made based on the collected responses. These students were not included in the final sample size.

To explore the habits and behaviour of the students related to sleep, the Sleep Hygiene Index was administered. It is a 13-item self-administered index to assess the behaviours that compromise sleep quality. Cronbach's α for the Sleep Hygiene Index is 0.66 and has good test-retest reliability ($r = 0.71$, $p < 0.01$). Total scores range from 0 to 52, with a higher score indicating worse sleep hygiene.^[16] The responses of various sleep hygiene practices in the Sleep Hygiene Index were recorded on the five-item Likert scale as Never, Rarely, Sometimes, Frequently and Always. These five

responses were categorized into two categories to analyse their association with sleep quality. We did not use cut off for sleep hygiene index as the Youdens index was low in ROC (Receiver Operating characteristic) analysis. (Supplementary Table 1)

The Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality of students in the past month. Its global score ranges from 0 to 21 with a higher score indicative of poorer sleep quality. A global PSQI score greater than 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% ($\kappa = 0.75$, $p < 0.001$) in distinguishing between good and poor sleepers. Therefore, participants with a PSQI score of ≤ 5 were considered to have good sleep quality, whereas those with a PSQI score > 5 were classified as having poor sleep quality.^[17]

The International Physical Activity Questionnaire - Short Form (IPAQ-SF) was used to assess the physical activity level of the students. It is an open-ended self-reported questionnaire that measures the type of intensity of physical activity and sitting time in daily life in the last 7 days in people aged 15 years and above. It is a validated tool having a good test-retest reliability and stability ($\alpha < 0.80$).^[18] As the IPAQ-SF does not provide a single composite score, the duration of moderate-to-vigorous physical activity and sitting time were used for analysis in accordance with the study objectives.

Self-reported percentage of marks in the last university exams (for the 1st year students, last board exam marks) and subjective satisfaction with the academic performance were used to determine the academic performance of the students. The subjective satisfaction level regarding academic performance was collected on a 5-item Likert scale. The categories of fully satisfied and satisfied to some extent were combined as satisfied, and unsatisfied and extremely unsatisfied as unsatisfied for analysis purposes. As the students were well-versed in the English Language, only the English versions of these scales were used for data collection.

Statistical Analysis

Data from Google Forms was downloaded into Microsoft Excel and analysed using the Statistical

Package for Social Sciences (SPSS version 28.0). Qualitative data were presented as frequency and percentages, and quantitative data as means and standard deviations. Normality of data was checked using a histogram, Q-Q plot, skewness, and kurtosis. The unpaired T-test and One-Way Anova were used to compare the mean SHI score among different demographic variables. Pearsons Chi-square test was used to see the association between individual hygiene practices and the prevalence of poor-quality sleep. To explore correlation between sleep hygiene index score and Global PSQI score, the Pearson correlation coefficient was calculated. Spearmans rho was used to see the correlation between sleep hygiene index score and duration of different quantitative variables. Multiple linear regression analysis was used to adjust for confounders for the mean score of the poor sleep hygiene index. The cutoff level for statistical significance was ≤ 0.05 .

Ethical consideration

The study was performed in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethical Committee of the medical college vide letter no: KCGMC/IEC/2023/137 dated 15th June 2023. Written permission was also taken from the principals of the participating colleges. Informed consent was obtained from the participants before data collection. The participants were explained the aims of the study, their rights regarding participation in the study and the confidentiality of their responses before they responded to the questionnaire

RESULTS

The study questionnaire was shared with 600 randomly selected undergraduate students, out of which 541 completed it, yielding a response rate of 90.2%.

The mean age of participants was 20.51 ± 1.84 years and the proportion of female participants was 59.0%. This may be attributed due to a greater number of female students in paramedical courses or a higher response rate among female students. The number of students in the 4th year was only 10.7%, which could be due to exclusion of BSc 4th year Nursing students and

Table 1: Distribution and Association of demographic and lifestyle variables with mean SHI score among study participants

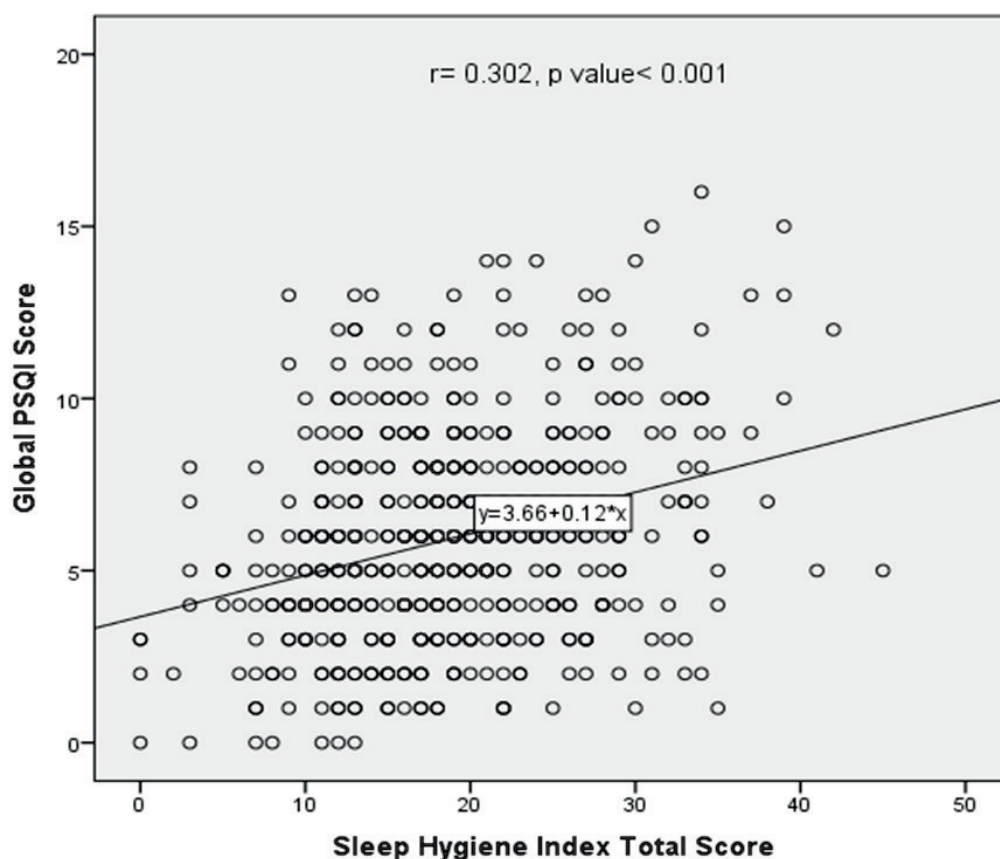
Variables		Frequency (N= 541) (Percentage)	SHI Score (Mean± SD)	Value of t- test or F- statistics	p value
Gender	Male	222 (41%)	17.91±7.91	-2.400	0.017*
	Females	319 (59.0%)	19.50±7.23		
Family Background	Rural	279 (51.6%)	18.63±7.77	-0.684	0.494*
	Urban	262 (48.4%)	19.08±7.35		
Type of Accommodation	Hostel	304 (56.2%)	19.44±7.20	14.239	<0.001#
	Paying Guest	69 (12.8%)	21.75±6.88		
	At home with parents or relatives	168 (31.0%)	16.58±7.92		
Study Course	MBBS	196 (36.2%)	19.53±6.75	13.127	<0.001#
	Paramedical courses (Physiotherapy and Nursing)	197 (36.4%)	20.14±7.66		
	Other Graduate courses	148 (27.4%)	16.22±7.88		
Year of study in the course	1st Year	232 (42.9%)	17.99±7.67	2.239	0.083#
	2nd Year	125 (23.1%)	19.95±8.04		
	3rd Year	126 (23.3%)	18.86±7.06		
	4th Year	58 (10.7%)	19.86±6.93		
Substance Abuse	Smoking	Yes	20 (3.7%)	2.055	0.040*
		No	521 (96.3%)		
	Alcohol	Yes	21 (3.9%)	2.728	0.007*
		No	520 (96.1%)		
	Other Drug Abuse (like bhang, ganja, cocaine, etc.)	Yes	05 (0.9%)	1.890	0.059*
		No	536 (99.1%)		
Screen Use	Smartphone	Yes	538 (99.4%)	1.650	0.100
		No	03 (0.6%)		
	Computer/ Laptop/ Tablet	Yes	204 (37.7%)	0.993	0.321
		No	337 (62.3%)		
	Television	Yes	128 (23.7%)	2.503	0.013
		No	413 (76.3%)		
Physical Activity	Play on Play station	Yes	110 (20.3%)	1.103	0.271
		No	431 (79.7%)		
	Walking for at least 10 minutes at a time	Yes	526 (97.2%)	0.577	0.564*
		No	15 (2.8%)		
	Moderate or vigorous physical activity other than walking	Yes	346 (63.96%)	2.339	0.020*
		No	195 (36.04%)		
Subjective Satisfaction with Academic Performance	Unsatisfied	90 (16.6%)	20.38±8.04	4.656	0.010#
	Neutral	153 (28.3%)	19.63±7.61		
	Satisfied	298 (55.1%)	17.98±7.31		
Sleep Quality	Good Quality (PSQId"5)	354 (65.4%)	16.51±7.45	-5.355	<0.001*
Poor Quality	(PSQI>5)	187 (34.6%)	20.08±7.35		

*Unpaired t-test,#One way ANOVA

Table 2. Distribution of individual Sleep hygiene practices among study participants

Sr. No	Sleep Hygiene Index Items	Responses [freq. (%)][n/N (N= 541)]				
		Never	Rarely	Sometimes	Frequently	Always
1	Daytime naps lasting two or more hours.	75 (13.9%)	155 (28.7%)	206 (38.1%)	52 (9.6%)	53 (9.8%)
2	Go to bed at different times from day to day.	72 (13.3%)	134 (24.8%)	178 (32.9%)	81 (15.0%)	76 (14.0%)
3	Get out of bed at different times from day to day	99 (18.3%)	175 (32.3%)	165 (30.5%)	52 (9.6%)	50 (9.2%)
4	Exercise to the point of sweating within 1 hour of going to bed.	267 (49.4%)	134 (24.8%)	93 (17.2%)	15 (2.8%)	32 (5.9%)
5	Stays in bed longer than one should two or three times a week.	121 (22.4%)	172 (31.8%)	51 (9.4%)	166 (30.7%)	31 (5.7%)
6	Use alcohol, tobacco, or caffeine within 4 hours of going to bed or after going to bed.	457 (84.5%)	36 (6.7%)	36 (6.7%)	08 (1.5%)	04 (0.7%)
7	Do something that may wake me up before bedtime (for example: play video games, use the internet, or clean).	210 (38.8%)	107 (19.8%)	141 (26.1%)	44 (8.1%)	39 (7.2%)
8	Go to bed feeling stressed, angry, upset, or nervous	122 (22.6%)	147 (27.2%)	190 (35.1%)	47 (8.7%)	35 (6.5%)
9	Use my bed for things other than sleeping (for example: watch television, read, eat, or study)	53 (9.8%)	95 (17.6%)	170 (31.4%)	95 (17.6%)	128 (23.7%)
10	Sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets).	313 (57.9%)	109 (4.1%)	70 (12.9%)	22 (4.1%)	27 (5.0%)
11	Sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy)	291 (53.8%)	107 (19.8%)	82 (15.2%)	26 (4.8%)	35 (6.5%)
12	Do important work before bedtime (for example: pay bills, schedule, or study)	71 (13.1%)	99 (18.3%)	194 (35.9%)	82 (15.2%)	95 (17.6%)
13	Think, plan, or worry when in bed.	82 (15.2%)	114 (21.1%)	172 (31.8%)	66 (12.2%)	107 (19.8%)

Figure 2. Correlation between sleep hygiene practices and sleep quality among study participants



differences in course duration as summarized in Table 1. Majority of the students walked for at least ten minutes at a time daily. However, nearly one third of students were not engaged in moderate or vigorous physical activity. The average total screen time was 281 minutes/day (nearly 5 hours/ day).

The mean score of the Sleep Hygiene Index among students was found to be 18.85 ± 7.57 . On bivariate analysis, sleep hygienic practices were poor (as indicated by significantly higher mean SHI scores) among females, students staying in hostel or in paying guests, enrolled in the MBBS and paramedical courses, smokers, alcohol users, lack of moderate to vigorous physical activity and academic dissatisfaction. Students with poor sleep quality had significantly higher SHI scores compared to those with good sleep quality (Table 1).

The most common poor sleep hygiene practice among study participants (in 41.3%) was regularly using the bed for things other than sleeping (for example:

watching television, reading, eating, or studying). Other frequently reported behaviours included, staying in bed longer than needed (36.4%); engaging in important work before bedtime like in study (32.7%); thinking, planning, or worrying in bed (32%), and everyday going to bed at different times (29%) as shown in Table 2.

Mean Sleep hygiene index score was positively correlated with sitting hours per day, duration of screen for non-academic purposes and total screen time. Moderate to vigorous physical activity duration per day showed a significant negative correlation with sleep hygiene index indicating that an increase in physical activity led to better sleep hygiene (Supplementary Table 2). A significant positive correlation between SHI and Global PSQI scores, indicating that poorer sleep hygiene was associated with poorer sleep quality is depicted in Figure 2.

The student having sleep hygiene practice to go and get out of bed at different times; use of beds for things

Table 3. Association of Sleep Quality with Individual Sleep Hygiene Practices

Sleep Hygiene Practices	Response on Likert scale	Good Quality (PSQId=5)	Poor Quality (PSQId>5)	P value
Daytime Nap of ≥ 2 hours	Never, Rarely, Sometimes Frequently, Always	152 (34.9%) 35 (33.3%)	284 (65.1%) 70 (66.7%)	0.767*
Go to bed at different times	Never, Rarely, Sometimes Frequently, Always	149 (38.8%) 38 (24.2%)	235 (61.2%) 119 (75.8%)	0.001*
Get out of bed at different times	Never, Rarely, Sometimes Frequently, Always	161 (36.7%) 26 (25.5%)	278 (63.3%) 76 (74.5%)	0.032*
Moderate/Vigorous exercise within 1 hour of bedtime	Never, Rarely, Sometimes Frequently, Always	170 (34.4%) 17 (36.2%)	324 (65.6%) 30 (63.8%)	0.809*
Stay in bed longer than expected	Never, Rarely, Sometimes Frequently, Always	122 (35.5%) 65 (33.0%)	222 (64.5%) 132 (67.0%)	0.561*
Use alcohol/ tobacco/ caffeine within 4 hours of going to bed or after going to bed.	Never, Rarely, Sometimes Frequently, Always	185 (35.0%) 02 (16.7%)	344 (65.0%) 10 (83.3%)	0.233#
Use things that wake me up before bedtime (internet or play videogames)	Never, Rarely, Sometimes Frequently, Always	170 (37.1%) 17 (20.5%)	288 (62.9%) 66 (79.5%)	0.003*
Go to bed feeling stressed, angry, upset or nervous	Never, Rarely, Sometimes Frequently, Always	175 (38.1%) 12 (14.6%)	284 (61.9%) 70 (85.4%)	<0.001*
Use of bed for things other than sleeping	Never, Rarely, Sometimes Frequently, Always	126 (39.6%) 61 (27.4%)	192 (60.4%) 162 (72.6%)	0.003*
Sleep on an uncomfortable bed	Never, Rarely, Sometimes Frequently, Always	175 (35.6%) 12 (24.5%)	317 (64.4%) 37 (75.5%)	0.120*
Sleep in an uncomfortable bedroom	Never, Rarely, Sometimes Frequently, Always	172 (35.8%) 15 (24.6%)	308 (64.2%) 46 (75.4%)	0.082*
Do important work before bedtime	Never, Rarely, Sometimes Frequently, Always	129 (35.4%) 58 (32.8%)	235 (64.6%) 119 (67.2%)	0.540*
Think, plan, and worry when in bed	Never, Rarely, Sometimes Frequently, Always	139 (37.8%) 48 (27.7%)	229 (62.2%) 125 (72.3%)	0.022*

*Pearson's chi-square test, #Fisher Exact test

Table 4. Multiple linear regression analysis for predictors of Sleep Hygiene Index Score

Variables		Sleep Hygiene Index Score ^a OR (95% CI)	p-value
Gender	Male	Reference Category	0.016
	Female	1.67 (0.32- 3.02)	
Sleep Quality	Good	Reference Category	<0.001
	Poor	2.69 (1.37- 4.02)	
Duration of screen use for non-academic purposes		0.09 (0.002- 0.017)*	0.013
Duration of screen use for academic purposes		-0.011 (-0.018- -0.004)*	0.004

aOR: adjusted odds ratio, CI: Confidence Interval, *beta coefficient (β)

other than sleeping like studying, eating or watching television; use of things like the internet before bedtime; to go to bed feeling stressed, angry, upset or nervous; and worry, think or plan when in bed had a significantly higher prevalence of poor sleep quality (Table 3).

A multiple linear regression analysis was conducted to examine the predictors of sleep hygiene, as measured by the total Sleep Hygiene Index (SHI) score and to adjust for potential confounding. The dependent variable was the total SHI score, and covariates were variables with a p-value <0.20 in the bivariate analysis. After adjusting covariates, female gender, poor sleep quality, and increased non-academic screen time were significantly associated with higher SHI scores indicating poorer sleep hygiene. In contrast, greater screen time for academic purposes was associated with better sleep hygiene (Table 4).

DISCUSSION

This cross-sectional study aimed to evaluate sleep hygiene practices and their association with sleep quality among undergraduate students. The mean score of sleep hygiene index was 18.85 ± 7.57 , comparable to that reported by **Seun-Fadipe et al** among Nigerian Undergraduate Students (Mean SHI of 19.0 ± 6.31).^[15] **Kaur et al** reported a higher mean SHI (31.27 ± 6.09) in their study among undergraduate students of Chandigarh city, India which is attributed to different scoring of the Likert scale from 1- 5 instead of 0-4 in our study and studies conducted in other countries.^[19] Other studies conducted in India and other countries reported higher mean SHI score. It might be due to inclusion of different streams of students and cultural context regarding sleep practices.^[6,10]

This study findings revealed that female students had 1.64 times more likely to have higher SHI score than males. This is consistent with a previous study by **Molla et al**.^[9] It may be due to higher stress sensitivity, hormonal fluctuations, and difference in psychological status in females.^[20,21] Another significant predictor of higher SHI score is screen use for non-academic purposes. Specifically, each additional minute spent on

non-academic screen use was associated with a 0.09-point increase in SHI score. In contrast, greater screen time for academic purposes was associated with better sleep hygiene. This distinction between academic and non-academic screen time suggests that the purpose of screen use, rather than total duration alone, may be more relevant in determining its impact on sleep behaviours. There might be possibility that screen use for academic purpose may be during the daytime while for non-academic purposes may be just before sleeping after finishing off the days tasks which negatively affects the sleep. This is also evident from association of internet use before bedtime (a component of sleep hygiene practice) with poor sleep quality. Studies of **Rezaei et al** and **Kumari et al** also reported that mobile use before going to bed had a significant association with poor sleep quality.^[22,23] Exposure to blue light from screens, particularly before bedtime, can delay melatonin secretion and disrupt circadian rhythms, thereby impairing sleep quality and sleep-related behaviours. Light emitting devices also delay the chosen bedtime and alertness.^[24,25,26]

This study found a significant positive correlation between sleep hygiene and sleep quality, as measured by the Sleep Hygiene Index (SHI) and the Pittsburgh Sleep Quality Index (PSQI), respectively. Other studies also reported similar results.^[11,13] Students with poor sleep quality are 2.69 times more likely to have worse sleep hygiene compared to those with good sleep quality underscoring the detrimental impact of poor sleep hygiene practices on sleep outcomes. These findings are consistent with existing literature that supports a strong link between sleep hygiene behaviours and sleep quality among college students.^[6,24,27]

Certain individual sleep hygiene behaviours were significantly associated with poor sleep quality on bivariate analysis. Participant behaviour of going to bed and getting out of bed at different times is significantly associated with poor sleep quality. Irregular sleep-wake schedules are known to disturb circadian rhythms and delay sleep onset.^[28] Additionally, using the bed for activities other than sleep can weaken the cognitive association between the bed and sleep, thereby impairing

sleep onset and maintenance.^[29] Psychological factors of sleep hygiene practices also played a notable role in sleep quality. Students who went to bed feeling stressed, angry, or upset, or those who engaged in thinking, planning, or worrying in bed, exhibited significantly poorer sleep quality. These findings align with previous research identifying cognitive hyper arousal as a contributor to sleep disturbances, particularly insomnia.^[30]

Strengths and Limitations:

This study included diverse samples of undergraduate students from medical, paramedical, and non-professional courses using stratified random sampling, enhancing representativeness. The use of validated instruments (SHI, PSQI, IPAQ-SF) strengthens measurement reliability. Multivariable regression analysis further improves the robustness of findings by adjusting for potential confounders. This study has some limitations. Due to the cross-sectional nature of the study design, a causal relationship between outcome and independent variables could not be established. Reliance on self-reported data may be subject to recall or social desirability bias. As the study was conducted in a single North Indian city, generalization to other regions, age groups, or non-college populations should be done with caution.

Conclusion

This study highlights the prevalent sleep hygiene practices leading to poor sleep quality among undergraduate students enrolled in various professional and non-professional courses. Female gender and higher non-academic screen use are associated with poorer sleep practices. The findings underscore the need for targeted interventions at individual levels such as promoting regular sleep schedules, limiting recreational screen exposure before bedtime, fostering stress management skills, and encouraging active lifestyles to improve sleep hygiene and overall well-being among students. Educational programs promoting healthy sleep habits should be integrated into university wellness initiatives to support students' academic and mental well-being.

Declaration:

Conflict of Interest: There is no conflict of interest.

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Use of AI: Artificial intelligence (AI) tools were used only to assist with language refinement in the manuscript. AI was not used for study design, data collection, data analysis, interpretation of findings, generation of scientific content, or drawing conclusions. All outputs were reviewed, verified, and approved by the authors, who remain fully responsible for the final content of the manuscript.

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