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Original Research Article

Sleep quality and its association with academic performance amongst students in colleges of health technology, Akure, Ondo State

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ABSTRACT

Background: Sleep constitutes a fundamental physiological phenomenon characterized by its intricate nature, whereby both the corporeal and cognitive domains undergo restorative processes for approximately eight hours each day.
Methods: It was a cross-sectional descriptive study which employed a multistage sampling method to recruit the study participants. A semi constructed questionnaire was distributed to assess the research questions. Cumulative grade point average (CGPA) was used to measure the academic performance while Pittsburgh sleep quality index (PSQI) was used to assess the sleep quality.
Results: Less than half of the students reported having good sleep quality (47%), while over half experienced poor sleep quality (53%). A significant number of students (49.5%) had lower credit grades, which may be attributed to the fact that nearly half of them had two to four carried-over courses from the previous semester. Factors that were associated with sleep quality are smoking (p=0.006), snoozing during lecture hours (p=0.036), taking coffee (p=0.0026) and using mobile phone before sleep (p=0.009).
Conclusions: This study underscores the link between sleep quality and academic performance among students at colleges of health technology. Notably, mobile phone usage before sleep was identified as a significant factor affecting both sleep quality and academic performance. It is recommended that Implementation of practical measures such as counseling services or adjustments to academic schedules to enhance sleep quality among students**.**

Keywords: Sleep quality, Cumulative grade point average, Academic performance, Students

INTRODUCTION

Sleep is an essential component for maintaining overall health and well-being. Its significance transcends the mere reduction of diurnal drowsiness; inadequate sleep is also a potential contributing factor for severe conditions such as Alzheimer's disease. Sleep, which is a multifaceted and innate physiological phenomenon, generally necessitates approximately eight hours of rest each day.[1] The quality of sleep pertains to individuals' satisfaction with various dimensions of the sleep experience, including onset, maintenance, duration, and rejuvenation upon awakening. Sleep serves as a fundamental pillar of human existence, profoundly affecting numerous physiological processes, including learning, memory consolidation, neurocognitive functionality, and psychological health.[2] Insufficient sleep detrimentally influences alertness, focus, and cognitive operations, rendering adequate nocturnal rest vital for optimal functioning. Typically, adults require around eight hours of sleep to sustain health.[3]

Academic performance, which serves as an indicator of student success across diverse disciplines, is generally assessed through classroom engagement, graduation statistics, and standardized examination scores. It

indicates the degree to which educational objectives are accomplished and can be measured through ongoing assessments or CGPAs.[4] For instance, in Nigeria, GPAs are frequently quantified on a scale ranging from zero to five or zero to seven, whereas in the United States, the grading scale spans from zero to four.[5]

Notwithstanding the established effects of sleep on health, numerous college students remain oblivious to its implications for their academic performance.[6] While they may acknowledge that suboptimal sleep quality can precipitate health-related issues such as mental health disorders, attentional deficits, and behavioral challenges, they often fail to grasp the full extent to which inadequate sleep influences their academic success. In Hong Kong, for example, 60% of college students report experiencing poor sleep quality, averaging less than seven hours of sleep per night.[7] Investigations conducted in Hong Kong reveal that as many as 75% of college students encounter intermittent sleep disturbances, with 15% indicating an overall perception of poor sleep quality.[8] Correspondingly, in Nepal, inadequate sleep quality affects 44.2% of medical students compared to 30.3% of their non-medical counterparts. International studies indicate that sleep disturbances affect 41% of students in Iran and as much as 90% in China. In Sudan, poor sleep quality has been correlated with diminished academic performance alongside various adverse health outcomes, including irritability, depressive symptoms, and lowered life satisfaction.[9]

In Sub-Saharan African nations such as Ethiopia and Nigeria, 62% and 32.5% of medical students report experiencing poor sleep quality, respectively. Despite the rigorous demands of medical education, which often compel students to prioritize academic responsibilities over sleep, empirical evidence suggests that poor sleep is associated with psychiatric disorders, physical health complications, impaired job performance, and learning disabilities. In light of these concerns, it is imperative to explore the correlation between sleep quality and academic performance among health technology students. These students confront distinctive challenges, including rigorous academic schedules, practical training, and elevated stress levels, all of which can substantially affect their sleep patterns and, in turn, their academic outcomes.

METHODS

Study design and participants

This cross-sectional descriptive study was conducted among students at colleges of health technology in Akure, Ondo State from August 2024 to September 2024. The research was carried out over one month, which may not capture long-term trends in sleep quality and academic performance across different academic periods.

To determine the sample size, Leslie Fischer's formula was used:

$$N=\frac{(Za)^2\times p(1-p)}{d^2}$$

Where: n=sample size, Z=Z statistic for a 95% level of confidence with 1.96 as the value for a two-tailed test, p=49.5% (Percentage of respondents with poor sleep quality (Seun-Fadipe and Mosaku), d=precision (in proportion to one usually set at 0.05).[10]

$$N=\frac{(1.96)^2\times 0.495(1-0.495)}{0.05^2}=384.12$$

A 10% non-response rate was anticipated, adjusting the sample size to 422.

A multistage sampling technique was employed, including:

Selecting colleges

Two out of six colleges of health technology were randomly selected.

Selecting departments

Six departments were randomly chosen from each selected college.

Selecting students

Students were stratified by department and sampled proportionally using systematic random sampling. These students who participated were then selected using systematic random sampling.

Ethical approval was obtained from the health research ethics committee, institute of public health, Obafemi Awolowo university, Ile-Ife. Permissions were secured from the authorities of Ondo State college of health technology Akure and Millennium college of health technology Akure. Participants were informed about the study, assured of privacy and confidentiality, and provided their consent. Their CGPAs were verified by their respective department heads.

Questionnaire

A semi-structured questionnaire was developed to gather information on sociodemographic variables, including age (as of the most recent birthday), sex, religion, and place of residence. Additionally, the questionnaire aimed to assess academic performance and factors influencing sleep quality.

Academic performance

Academic performance was evaluated by asking students to report their CGPA from the semester immediately preceding the study period. In the institutions surveyed, CGPA scores range from 1.00 to 5.00. The classification

for CGPA scores is as follows: Distinction: 4.50-5.00, upper credit: 3.50-4.49, lower credit: 2.50-3.49, pass: 1.00-2.49, fail: below 1.00

PSQI

The PSQI is a self-assessment tool used to evaluate sleep quality over the past month.[11] It consists of 19 items that are aggregated into 7 component scores, covering: Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction.

Each component score ranges from 0 (no difficulty) to 3 (severe difficulty). Sum of these 7 component scores yields a global score ranging from 0-21. A global PSQI score of 5 or less indicates good sleep quality, while a score >5 suggests poor sleep quality. This tool has been previously validated for use among students in Nigeria.

Data analysis

Data were analyzed using the statistical package for social sciences (SPSS) version 25. Frequency distributions of variables calculated, and chi-square tests employed to examine associations between categorical variables. Statistical significance was set at $p<0.05$.

RESULTS

The 422 questionnaires were administered to respondents and 396 were retrieved back. Others were incompletely filled or not returned back. The response rate was 93.8%.

The majority of the students (53.8%) fall to less than 20 years of age as at last birthday, 90.7% are female, most (87.6%) of the students are Christians. More than half of the student's place of residence are outside the school hostel and 66.4% are second year students.

However, most students (27%) had fairly good and bad subjective sleep quality, 37% sleep latency of 31-60 minutes, 31% sleep duration of 5-6 hours, 39% habitual sleep efficiency of 65-74%, 37% sleep disturbances of value 10-18, 40% use of sleeping medication not during past month, 28% daytime dysfunction of value 5-6. Global PSQI showed that 53% had poor sleep quality.

Furthermore, 20 (5.1%) had distinction, 110 (27.8%) had upper credit, 196 (49.5%) had lower credit, 48 (12.1%) had pass and 22 (5.6%) had fail. The majority of the respondents had lower credit in their academic performance. The table shown that 310 (78.3%) of the respondents engage in group discussion while 86 (21.7%) did not engage in group discussion.

Table 1: Socio-demographic characteristics of the respondents, (n=396).

Variables	Parameters	N	Percentage (%)
Age as at last birthday (in years)	<20	213	53.8
	21-30	175	44.2
	31-40	6	1.5
	41-50	2	0.5
	Total	396	100
Sex	Male	37	9.3
	Female	359	90.7
	Total	396	100
Religion	Christianity	347	87.6
	Islam	46	11.6
	Traditional	3	0.8
	Total	396	100
Place of residence	School hostel	129	32.6
	Outside the school hostel	267	67.4
	Total	396	100
Year of study	2nd	263	66.4
	3rd	99	25.0
	4th	34	8.6
	Total	396	100
Colleges of health	OSCHT	294	74.2
	MCHT	102	25.8
	Total	396	100
Department	CHEW	93	23.5
	HIM	87	22.0
	MLT	63	15.9
	Pharm tech	37	9.3
	Dental therapy	28	7.1
	Environmental health	88	22.2
	Total	396	100

Table 2: Sleep quality among students in colleges of health technology, Akure, (n=396).

Variables	N	Percentage (%)
Subjective sleep quality (Component 1)		
Very good	86	22
Fairly good	107	27
Fairly bad	107	27
Very bad	96	24
Sleep latency (Component 2)		
≤15 minutes	72	18
16-30 minutes	114	29
31-60 minutes	146	37
<60 minutes	64	16
Sleep duration (Component 3)		
>7 hours	102	26
6-7 hours	84	21
5-6 hours	124	31
<5 hours	86	22
Habitual sleep efficiency (Component 4)		
>85%	47	12
75-84%	131	33
65-74%	156	39
<65%	62	16
Sleep disturbances (Component 5)		
Not during the past month	114	29
Less than a week	77	19
Once or twice a week	147	37
Three or more times a week	58	15
Use of sleeping medication (Component 6)		
Not during the past month	160	40
Less than a week	86	22
Once or twice a week	68	17
Three or more times a week	82	21
Daytime dysfunction (Component 7)		
1-2 days	98	25
3-4 days	102	26
5-6 days	86	21
Everyday	110	28
Sleep quality		
Good (score ≤5)	186	47.0
Poor (score>5)	210	53.0

Table 3: Academic performance of students in colleges of health technology, Akure, (n=396).

Variables	N	Percentage (%)
Academic performance		
Distinctions	20	5.1
Upper credit	110	27.8
Lower credit	196	49.5
Pass	48	12.1
Fail	22	5.6
Total	396	100
Number of courses where students had reseated in the last session		
One	117	29.5
Two-four	183	46.2
Five and above	4	1.0
None	92	23.2
Total	396	100

Table 4: Factors associated with sleep quality among students in colleges of health technology, Akure.

Variables	Good sleep quality, N (%)	Poor sleep quality, N (%)	Statistical indices (Chi square, df and p value)
Smoking			
Yes	23 (12)	10 (5)	X^2=7.465, df=1, p=0.006
No	163 (88)	200 (95)	
Snoozing during lecture hours			
Yes	46 (24.7)	60 (28.6)	X^2=0.742, df=1, p=0.389
No	140 (75.3)	150 (71.4)	
Taking coffee			
Yes	49 (24.7)	48 (28.6)	X^2=4.365, df=1, p=0.026
No	137 (75.3)	162 (71.4)	
Suffering from preexistence of chronic diseases e. g., asthma			
Yes	4 (2.2)	1 (0.5)	X^2=2.218, df=1, p=0.136
No	182 (97.8)	209 (99.5)	
Waking up energetic			
Yes	101 (54.3)	103 (49.0)	X^2=1.090, df=1, p=0.296
No	85 (45.7)	107 (51.0)	
Having any regular difficulty with sleeping			
Yes	27 (14.5)	30 (14.3)	X^2=0.004, df=1, p=0.948
No	159 (85.5)	180 (85.7)	
Taking any medications to help with sleep			
Yes	24 (12.9)	38 (18.1)	X^2=2.014, df=1, p=0.156
No	162 (87.1)	172 (81.9)	
Using mobile phone before sleep			
Yes	149 (80)	188 (90)	X^2=6.898, df=1, p=0.009
No	37 (20)	22 (10)	
Experience psychological distress before			
Yes	11 (5.9)	11 (5.2)	X^2=0.086, df=1, p=0.769
No	175 (94.1)	199 (94.8)	
Taking alcohol			
Yes	31 (16.7)	34 (16.2)	X^2=0.016, df=1, p=0.898
No	155 (83.3)	176 (83.8)	

Factors that were associated with sleep quality are smoking (p=0.006), snoozing during lecture hours (p=0.036), taking coffee (p=0.0026) and using mobile phone before sleep (p=0.009).

DISCUSSION

Sleep quality

Less than half of the students reported having good sleep quality, while over half experienced poor sleep quality. This result contrasts with the findings of a research conducted in Nigeria, who reported a more balanced distribution between good and poor sleep quality among students.[10] Our results are in contrast with the previous research, who found that more than half of the population experienced good sleep quality, with less than half reporting poor sleep quality.[6]

Academic performance

A significant number of students had lower credit grades, which may be attributed to the fact that nearly half of them had two to four carried-over courses from the previous semester. This finding is consistent with previous research, who observed that students with carried-over courses from previous semesters tended to perform worse academically.[12] The impact of failing courses on CGPA is a likely factor contributing to this trend, as CGPA serves as the primary measure of academic performance in this study.

Factors associated with sleep quality

The association between smoking and sleep quality was statistically significant. Smoking adversely affects various aspects of sleep, including latency, duration, quality, and habitual efficiency. Nicotine, a key component of cigarettes, disrupts sleep by causing disturbances and cravings, particularly when used before bedtime. Nicotine's stimulating effects and its impact on neurotransmitter release, such as dopamine, contribute to poor sleep quality.[13] Additionally, smoking can lead to respiratory issues, snoring, and sleep apnea, further impacting sleep quality.[14]

The use of coffee was also significantly associated with sleep quality. Caffeine, as noted by in research, negatively affects sleep quality.[15] Our findings corroborate this, indicating that coffee consumption can impair sleep.

Similarly, the use of mobile phones before bedtime was significantly associated with poor sleep quality. Previous research, found that electromagnetic radiation from mobile phones can delay melatonin production, thereby affecting sleep onset.[16] Most respondents in our study reported using mobile phones before sleep, which aligns with research, who found that mobile phone usage near bedtime worsens sleep quality as measured by PSQI.[17] This supports the notion that mobile phone use before sleep negatively impacts sleep quality.

The association between sleep quality and academic performance

Our study found a significant association between sleep quality and academic performance. More than half of the students had poor sleep quality, which aligns with research, who reported a significant link between poor sleep quality and low academic performance.[18] Poor sleep quality appears to have a considerable effect on students' overall GPA.

Limitations

The study may be limited by the size and diversity of the sample, which might not be representative of all students in health technology programs. This could affect the generalizability of the findings to other contexts or populations. The study is cross- sectional which will only provide a snapshot of the association between sleep quality and academic performance at a single point in time. This design cannot establish causality or account for changes over time. There are numerous factors that can influence both sleep quality and academic performance, such as mental health, physical health, lifestyle choices, and socio-economic status. Controlling for all potential confounders can be challenging. Moreover, external factors such as noise, living conditions, and school schedules could influence sleep quality and were not fully accounted for in the study, leading to potential bias.

CONCLUSION

This study underscores the link between sleep quality and academic performance among students at Colleges of Health Technology. Notably, mobile phone usage before sleep was identified as a significant factor affecting both sleep quality and academic performance. Students' nighttime mobile phone use was linked to poorer academic outcomes, highlighting the need for further investigation into the causes of poor academic performance and sleep quality.

Recommendations

Based on these findings, we suggest the following: Interventions for improving sleep quality: Implement practical measures such as counseling services or adjustments to academic schedules to enhance sleep quality among students. Further research: Conduct longitudinal studies to monitor changes over time or intervention-based studies to evaluate the effectiveness of specific strategies for improving sleep. Awareness campaigns: Educate students about the importance of adequate sleep and its impact on academic performance.

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