



Chibueze Anosike*,
Abdulmuminu Isah, Obinna
Felix Dim, Cynthia Chinaza
Enete, Maxwell Ogochukwu
Adibe
Department of Clinical
Pharmacy and Pharmacy
Management, University of
Nigeria, 410001, Nsukka,
Enugu State, Nigeria
*University of Nigeria,
6 Solutu St.
Nsukka, 410101
Nigeria

Tel: +234(0)7035485509
Email:
anosoc2010@gmail.com

Effects of sleep quality on mental health and academic performance among final-year pharmacy students at a university in Enugu, Nigeria

Background: Pharmacy students have a rigorous academic workload that can interfere with their sleeping time. This study aimed to determine the correlates of sleep quality with mental health and academic performance of final-year pharmacy students at a Nigerian university.

Method: The present study used the paper-based self-administered questionnaires such as the Pittsburgh Sleep Quality Index, Generalized Anxiety Disorder Scale, and Patient Health Questionnaire to conduct a cross-sectional study among final-year pharmacy students at the University of Nigeria, Nsukka, Enugu State, Nigeria. The questionnaires were validated and reliable, as their Cronbach's alpha were within acceptable range ($\alpha > 0.7$). The examination score in clinical pharmacy courses was used to assess students' academic performance. The data analysis was performed using descriptive statistics and Pearson correlation.

Results: Of the 274 respondents, about 186 (68%) students had bad sleeping habits. The prevalence of anxiety and depression were found to be present in 134 (48.9%) and 128 (46.7%), respectively. Anxiety ($r = 0.229$, $p < 0.01$) and depression ($r = 0.211$, $p < 0.01$) had a positive relationship with students' quality of sleep. However, no connection was found between sleep quality and academic performance ($r = -0.022$, $p > 0.05$).

Conclusion: The quality of sleep among final-year pharmacy students was linked to anxiety and depression. However, student's sleep quality has no bearing on academic success.

Keywords: Academic Success, Mental Health, Nigeria, Pharmacy Students, Sleep Quality

تأثيرات جودة النوم على الصحة العقلية والأداء الأكاديمي بين طلاب الصيدلة في السنة النهائية في جامعة في إنوجو، نيجيريا

الخلفية: طلاب الصيدلة لديهم عبء عمل أكاديمي صارم يمكن أن يتداخل مع وقت نومهم. هدفت هذه الدراسة إلى تحديد علاقة جودة النوم بالصحة العقلية والأداء الأكاديمي لطلاب الصيدلة في السنة النهائية في إحدى الجامعات النيجيرية.

الطريقة: استخدمت الدراسة الحالية الاستبيانات الورقية ذاتية الإدارة مثل مؤشر جودة النوم في بيتسبرغ، ومقياس اضطراب القلق العام، واستبيان صحة المريض لإجراء دراسة مقطعية بين طلاب الصيدلة في السنة النهائية في جامعة نيجيريا، نسوكا، ولاية إنوجو، نيجيريا. تم التحقق من صحة الاستبيانات وموثوق بها، حيث كانت ألفا كرونباخ ضمن النطاق المقبول ($\alpha > 0.7$). تم استخدام درجة الامتحان في مقررات الصيدلة السريرية لتقييم الأداء الأكاديمي للطلاب. تم إجراء تحليل البيانات باستخدام الإحصاء الوصفي وارتباط بيرسون.

النتائج: من بين 274 مستجيباً، كان لدى حوالي 186 طالباً (68%) عادات نوم سيئة. وجد أن انتشار القلق والاكتئاب موجود في 134 (48.9%) و 128 (46.7%) على التوالي. كان للقلق ($r = 0.229$, $p < 0.01$) والاكتئاب ($r = 0.211$, $p < 0.01$) علاقة إيجابية بنوعية نوم الطلاب. ومع ذلك، لم يتم العثور على علاقة بين جودة النوم والأداء الأكاديمي ($r = -0.022$, $p > 0.05$).

الخلاصة: ارتبطت جودة النوم بين طلاب السنة النهائية للصيدلة للقلق والاكتئاب. ومع ذلك، لا تؤثر جودة نوم الطلاب على النجاح الأكاديمي.

الكلمات المفتاحية: النجاح الأكاديمي، الصحة العقلية، نيجيريا، طلاب الصيدلة، جودة النوم

تأثير كفاءة خواب بر سلامت روان و عملکرد تحصیلی بین دانشجویان سال آخر داروسازی در دانشگاهی در انوگو، نيجيريا

زمینه و هدف: دانشجویان داروسازی دارای حجم بالایی از کار در دوران تحصیل هستند و این امر می تواند در زمان خواب آنها اختلال ایجاد کند. این مطالعه با هدف تعیین همبستگی کیفیت خواب با سلامت روان و عملکرد تحصیلی دانشجویان سال آخر داروسازی در دانشگاه نيجيريا انجام شد.

روش: برای انجام یک مطالعه مقطعی در بین دانشجویان سال آخر داروسازی در دانشگاه نيجيريا، انسوکا، انوگو، از پرسشنامه شاخص کیفیت خواب پیتسبورگ، مقياس اختلال اضطراب فراگیر، و پرسشنامه سلامت بیمار استفاده شدند. پرسشنامه‌ها روایی و پایایی داشتند، زیرا آلفای کرونباخ آنها در محدوده قابل قبولی بود ($\alpha > 0.7$). نمره امتحان در دوره های داروسازی بالینی برای ارزیابی عملکرد تحصیلی دانشجویان استفاده شد. تجزیه و تحلیل داده ها با استفاده از آمار توصیفی و همبستگی پیرسون انجام شد.

یافته‌ها: از 274 پاسخ‌دهنده، حدود 186 (68%) از دانشجویان عادات بد خوابیدن داشتند. شیوع اضطراب و افسردگی به ترتیب در 134 نفر (48.9%) و 128 نفر (46.7%) بود. اضطراب ($r = 0.229$, $p < 0.01$) و افسردگی ($r = 0.211$, $p < 0.01$) با کیفیت خواب دانشجویان رابطه مثبت داشت. با این حال، هیچ ارتباطی بین کیفیت خواب و عملکرد تحصیلی یافت نشد ($r = -0.022$, $p > 0.05$).

نتیجه‌گیری: کیفیت خواب دانشجویان سال آخر داروسازی با اضطراب و افسردگی مرتبط بود. با این حال، کیفیت خواب دانشجویان تأثیری بر موفقیت تحصیلی نداشت.

واژه های کلیدی: موفقیت تحصیلی، سلامت روان، نيجيريا، دانشجویان داروسازی، کیفیت خواب

انورگو، نائيجيريا میں یونیورسٹی میں فارمیسی کے آخری سال کے طلباء کے درمیان ذہنی صحت اور تعلیمی کارکردگی پر نیند کے معیار کے اثرات

پس منظر: فارمیسی کے طلباء پر سخت تعلیمی کام کا بوجھ ہوتا ہے جو ان کے سونے کے وقت میں مداخلت کر سکتا ہے۔ اس مطالعہ کا مقصد نائيجيريا کی ایک یونیورسٹی میں فارمیسی کے آخری سال کے طالب علموں کی ذہنی صحت اور تعلیمی کارکردگی کے ساتھ نیند کے معیار کے ارتباط کا تعین کرنا تھا۔

طریقہ: موجودہ مطالعہ میں کاغذ پر مبنی خود زیر انتظام سوالنامے جیسے کہ پشیرگ سلیپ کوالٹی انڈیکس، جنرلائزڈ اینگریڈیٹ ڈس آرڈر اسکیل، اور پیشنٹ ہیلتھ سوالنامے کا استعمال کیا گیا تاکہ نائيجيريا یونیورسٹی میں فارمیسی کے آخری سال کے طلباء کے درمیان کراس سیکشنل مطالعہ کیا جا سکے۔ Enugu, Nsukka ریاست، نائيجيريا۔ سوالنامے درست اور قابل اعتماد تھے، کیونکہ ان کا کرونباخ کا الفا قابل قبول حد ($\alpha > 0.7$) کے اندر تھا۔ کلینیکل فارمیسی کورسز میں امتحانی اسکور کا استعمال طلباء کی تعلیمی کارکردگی کا جائزہ لینے کے لیے کیا گیا تھا۔ ڈیٹا کا تجزیہ وضاحتی اعداد و شمار اور پیرسن ارتباط کا استعمال کرتے ہوئے کیا گیا تھا۔

نتائج: 274 جواب دہندگان میں سے، تقریباً 186 (68%) طلباء کو نیند کی بری عادت تھی۔ اضطراب اور افسردگی کا پھیلاؤ بالترتیب 134 (48.9%) اور 128 (46.7%) میں پایا گیا۔ بے چینی ($r = 0.229$, $p < 0.01$) اور ڈپریشن ($r = 0.211$, $p < 0.01$) کا طلباء کی نیند کے معیار کے ساتھ مثبت تعلق تھا۔ تاہم، نیند کے معیار اور تعلیمی کارکردگی ($r = -0.022$, $p > 0.05$) کے درمیان کوئی تعلق نہیں ملا۔

نتیجہ: فارمیسی کے آخری سال کے طالب علموں میں نیند کے معیار کا تعلق بے چینی اور افسردگی سے تھا۔ تاہم، طالب علم کی نیند کے معیار کا تعلیمی کامیابی پر کوئی اثر نہیں ہے۔

مطلوبہ الفاظ: تعلیمی کامیابی، دماغی صحت، نائيجيريا، فارمیسی طلباء، نیند کا معیار

INTRODUCTION

Sleep has long been recognized as a crucial component of human health and well-being (1). To preserve and improve physical and mental health, a typical adult is supposed to sleep for 7 hours or more every night on a regular basis (1,2). Sleep deprivation could negatively affect a person's health and increases the chances of developing obesity, cardiovascular disease, and diabetes mellitus (1,3,4). Insufficient sleep can adversely affect mental health, memory, learning, and performance (5). Sleep deficiency has the ability to impair cognitive and psychomotor functions, potentially resulting in poor academic performance (6).

The quality of sleep and its effects on academic success and mental wellbeing among healthcare trainees have been reported previously (7). Bad sleeping habits, for example, were discovered among medical students in Saudi Arabia, Iran, Malaysia, Estonia, Peru, and Brazil, and were linked to lower academic success and diminished mental health (8-13). Furthermore, a study in the United States examined the effect of sleep quality on the academic success of pharmacy students (14). In the study, the Pittsburgh Sleep Quality Index was used by the authors to measure the participants' quality of sleep, and self-reported cumulative grade point average to assess students' academic success. The findings of the study revealed that pharmacy students, particularly those with lower self-reported grade point averages, have poor sleep quality (14).

Pharmacy students in Nigeria face a heavy academic workload as well as extracurricular activities that may interfere with their sleep (15). As students progress through the pharmacy program, their workload appears to increase as they are exposed to clinical and experiential training. Academic activities that compete with pharmacy students' sleeping time include, for example, regular classroom lectures, practical laboratory sessions, undergraduate research projects, and clinical clerkship training in hospital and community pharmacy settings (15,16). However, there is a scarcity of information on the quality of sleep of pharmacy students, particularly in a resource-limited multi-cultural and multi-ethnic settings such as Nigeria. In Nigeria, issues pertaining to mental health are generally given little attention because of its accompanying myths, misconceptions, and stigma (17). Mental health issues seem more common among Nigerian university students compared to the general population. For example, the estimated prevalence of depression and generalized anxiety disorder in the Nigerian population were 5.5% and 3.5%, respectively (18). On the other hand, depression and anxiety prevalence in pharmacy undergraduate students in a Nigerian university was recently estimated to be 44.6% and 63.5%, respectively (19). Thus, understanding the correlation between sleep quality, academic performance, and mental health among Nigerian pharmacy students may provide a foundation for potential interventions aimed at improving students' mental and physical wellbeing. Therefore, the aim of this study was to determine the impact of sleep quality on the mental health and academic performance of final-year pharmacy students at a university in Enugu, Nigeria.

METHODS

Study design, setting, and participants

This study was designed as a cross-sectional descriptive survey of final-year pharmacy undergraduate students at the University of Nigeria, Nsukka, Enugu State, Nigeria. All 336 final-year pharmacy students of the university were approached for the study. The inclusion criteria were: (1) being a final-year pharmacy student, (2) being willing to participate in the study, and (3) being eager to adhere to the study protocols. However, students who took part in the questionnaire validation process were excluded. Convenience sampling method was used to recruit participants in this study. The study location was one of Nigeria's well-established pharmacy schools, with a diverse student population from various ethnic and socioeconomic backgrounds. The university currently offers Bachelor of Pharmacy degree programs.

Data collection procedure

Data for this study were gathered through the use of self-administered paper-based survey instruments. The primary investigator initially presented the students with the study objective and protocol. The questionnaires were assigned unique study identity numbers. This was done to ensure that students' examination scores from the official result spreadsheet could be easily retrieved and matched. After the regular classes, the printed survey instruments were distributed to the participants. The survey instruments were filled out and returned to the researchers and their assistants by the participants on their own. If clarifications were required, the research team provided them. The data was obtained from March 1 to April 6, 2021.

Study instruments

The Pittsburgh Sleep Quality Index (PSQI), the Generalized Anxiety Disorder Scale (GAD-7), and the Patient Health Questionnaire (PHQ-9) were utilized to collect data (20-22). The present researchers use the original version of the PSQI, which is widely validated and reliable, to assess the students' sleep quality. The Cronbach's alpha of the PSQI was 0.810. The PSQI had nine items. Four of the items were open-ended (items 1-4) and the others had Likert scales (items 5-9). When scoring the PSQI, 7 component scores were computed from the 9 questionnaire items. A score between 0 to 3 was given to each component (20). Zero represents no difficulty, while 3 indicates severe difficulty. By adding the seven scores of the components, a total score between 0 to 21 was generated. Higher aggregate scores represent poor quality of sleep. A total score of 5 or more indicated poor sleep quality, while less than 5 indicated good sleep quality (20).

The original version of GAD-7 was used to assess the participants' anxiety levels. The Cronbach's alpha of GAD-7 was 0.864, which was within an acceptable limit. There were seven items in the questionnaire, with an answer on a four-point Likert scale, making it quick to complete (21). The overall GAD-7 score was between 0 to 21, with the lowest score being 0 and the highest being 21. A higher anxiety score meant that the anxiety was more serious. Anxiety levels were classified as

normal, mild, moderate, and severe based on the aggregate score ranges of 0-4, 5-9, 10-14, and 15-21, respectively (21). The original version of PHQ-9 was used to screen participants for depression. PHQ-9 assesses how much an individual has been bothered by depression symptoms in the last two weeks (22). The PHQ-9 was shown to be valid and reliable, as the Cronbach's alpha was 0.829. The questionnaire contained nine items, each rated on a Likert scale of four points. Each item's score was added up to produce an aggregate score between 0 to 27. The higher the score, the more depressed the person is (22). The severity of depression was classified into normal, mild, moderate, moderately severe, and severe based on the aggregate score ranges of 0-4, 5-9, 10-14, 15-19, and 20-27, respectively (22). In addition, demographic information about students was gathered using a specially designed demographic form. Gender, age, marital status, stipend, level of physical activity, living conditions, school attendance, cigarette smoking, alcohol consumption, and dietary habits were among the demographic data collected.

Measure of academic performance

The present researchers used the penultimate year of official and clinical pharmacy professional examination results to evaluate students' academic performance in this study. This was because clinical pharmacy professional examination was among the most recent examinations written by the study participants. The pass mark for the examination was 50%. The maximum possible score for the examination was 100%. Unlike previous studies that utilized self-reported cumulative grade point average as a measure of academic performance, this study used the official student scores in a professional examination, which seems more reliable.

Data analysis

The data was coded and entered into IBM Statistical Products and Services Solution (SPSS) version 21 for Windows software. The data was then double-checked for accuracy. Any figures that were entered wrongly were corrected. The demographic profiles of students, their levels of anxiety and depression, and their academic performance were all summarized using descriptive statistics. The Pearson correlation was utilized to examine the connection between students' quality of sleep, anxiety and depression severity, and academic performance. $P < 0.05$ was used to define statistical significance.

Ethical Statement

The research was granted permission by the University of Nigeria, Nsukka's Faculty of Pharmaceutical Sciences Research Ethics Committee, with reference number FPSRE/UNN/21/0007. All study participants provided written informed consent. There was no way of knowing who the respondents were because no personally identifying information was obtained. All of the information gathered was treated with the utmost secrecy.

RESULTS

Students' demographic data

Table 1 contained students' demographic data. A total of 274 final-year pharmacy students took part in the survey, yielding an 81.5 percent response rate. A little more than half of the

students were female 144 (52.6%) and between the ages of 25 and 29 years 141 (51.5%). At least, once a week, more than half of the participants 145 (53.0%) participate in intense physical activity. About 213 (78%) of students said they went to class on a daily basis. Alcoholic drinks are consumed by more than a quarter of students 90 (32.8%). The majority of the participants 205 (74.8%) reported that they eat a regular, balanced diet.

Pharmacy student's quality of sleep, mental health, and

Table 1. Pharmacy students' demographic characteristics (n = 274)

Demographic variables	Frequency (Percentage)
Gender	
Male	130 (47.4)
Female	144 (52.6)
Age (years)	
20-24	130 (47.4)
25-29	141 (51.5)
30-34	2 (0.7)
35 and above	1 (0.4)
Marital status	
Single	252 (92.0)
Married	22 (8.0)
Stipend	
Not sufficient	117 (42.7)
Meets the need	133 (48.5)
Allows saving	24 (8.8)
Vigorous physical activity*	
Three times a week	67 (24.5)
Once a week	78 (28.5)
Not at all	75 (27.4)
Living condition	
Hostel	96 (35.0)
Alone	112 (40.9)
With roommates	41 (15.0)
With family	25 (9.1)
School attendance	
Regular	213 (77.7)
Irregular	61 (22.3)
Smoke cigarette	
No	261 (95.3)
Yes	13 (4.7)
Take alcoholic beverage	
No	184 (67.2)
Yes	90 (32.8)
Diet quality	
Unhealthy	69 (25.2)
Healthy	205 (74.8)

*Some data were missing

academic performance

Table 2 contains students' quality of sleep, mental wellbeing, and academic performance. Approximately 68% of students were sleep deprived. Anxiety was found in 134 (48.9%) of the students, while the prevalence of depression was 128 (46.6%) among the students. The clinical pharmacy professional examination was passed by the vast majority of students 194 (70.8%). In fourth-year clinical pharmacy courses, the average examination score was 53.19 ± 10.58 . Furthermore, the results of Pearson correlation test demonstrated that anxiety ($r = 0.229, p = 0.001$) and depression ($r = 0.211, p = 0.001$) had a weak positive relationship with sleep quality. However, the quality of sleep, on the other hand, had no correlation with students' performance in clinical pharmacy professional examination ($r = -0.022, p > 0.05$).

Table 2. Pharmacy student's sleep quality, mental health, and academic performance	
Variable	Frequency (Percentage)
Sleep quality	
Good	88 (32.1)
Poor	186 (67.9)
Anxiety	
Normal	140 (51.1)
Mild anxiety	71 (25.9)
Moderate anxiety	46 (16.8)
Severe anxiety	17 (6.2)
Depression	
Normal	146 (53.3)
Mild depression	73 (26.6)
Moderate depression	37 (13.5)
Moderately severe depression	16 (5.8)
Severe depression	2 (0.7)
Clinical pharmacy professional examination	
	53.19 ± 10.58 (33.0-80.00)*
Fail	80 (29.2)
Pass	194 (70.8)

*Mean \pm Standard deviation (Minimum-Maximum)

DISCUSSION

This study evaluated the impact of sleep quality on pharmacy students' mental health and academic performance. The study's key findings revealed that nearly 68% of participants had poor quality of sleep and both anxiety and depression were common. Sleep quality was inversely related to mental health, according to the findings. However, there was no connection between sleep quality and academic performance in this study.

The majority of the students had poor sleeping habits. In a Saudi Arabian study of medical students (63.2%) and an

Iranian study of pharmacy students (67.4%), comparable prevalence of poor sleep quality was reported (6,12). In comparison to the findings of the current study, pharmacy students in the United States were found to have a lower prevalence of poor quality of sleep (55%) (14). However, studies of university students in Northern Malaysia (32.8%) and Lebanon (37.1%) found a much lower rate of bad sleep quality than the current research (23,24). Nevertheless, the prevalence of poor sleep quality in medical students in Saudi Arabia has been higher (25). The high prevalence of poor quality of sleep in this study may be attributed to the high academic pressures that pharmacy students face, especially in their final year. Students in pharmacy deprive themselves of sleep by spending more time at night reading, working on class assignments, or documenting reports of undergraduate project.

Anxiety and depression were shown to be quite widespread among the study's participants. Conversely, a recent study found that depression was less common (18%) among medical and pharmacy students in the United States (26). The findings of the present study on the prevalence of anxiety and depression are similar to those of an Iranian survey of medical students, in which almost half of the medical students have psychological stress. These psychological stresses, according to the authors, affect the students' mental health and academic performance (27). In an online survey of Nigerian pharmacy students, a similar prevalence of depression (44.6%) was recorded (19). Research in Malaysia found a similar prevalence of depression in undergraduate pharmacy students (47.4%) (28). Egyptian research, however, discovered that medical students have a higher rate of depression (65%) and anxiety (73%) than the general population (29). The high rate of depression and anxiety in this study could be a reflection of the demanding curricular content, a lack of social support, and low socioeconomic status. Additionally, it should be noted that the present study was conducted during COVID-19 pandemic, hence, could partly explain the high prevalence of symptoms of anxiety and depression observed in the study. The COVID-19, like other infectious epidemics in the past, has the potential to affect both the physical and psychosocial wellbeing of people in general, whether infected or not. Generally, infectious disease outbreaks are often associated with fear and emotional distress. Consequently, uncontrolled persistent fear and emotional distress could lead to or aggravate mental health problems such as anxiety, stress, and depression (30, 31).

The present researchers discovered a link between sleep quality and mental health among pharmacy students in their final year. Medical students in Saudi Arabia (12, 25), Mexico (32), China (33), and Egypt (29) have also registered similar results. The results of this study back up previous research that shows a link between sleep problems and a variety of mental illnesses, particularly mood and anxiety disorders. Bad sleep quality is linked to a number of sleep problems, which may initiate or aggravate psychological pain and mental disorders in university students.

Sleep quality had no connection with pharmacy students' academic performance. Similar to the findings of the current

study, cross-sectional surveys of Saudi Arabian and Palestinian medical students found no relationship between sleep quality and academic performance (34, 35). In a cross-sectional survey at Iran's Kermanshah University of Medical Sciences, little or no connection was found between sleep quality and academic performance of medical students was discovered (36). A German study has also found that the schedule of sleep-waking activity was a better determinant of academic performance in medical school than sleep quality and duration (37). In contrast, a recent study in the United States found that poor quality of sleep was connected to poor academic grades among pharmacy students (14). In Brazil, poor sleep quality was linked to below average academic performance in medical students (38). The evidence showed that a number of variables other than sleep quality could possibly predict pharmacy students' academic success in this research. A longitudinal analysis of the relationship between quality of sleep and academic performance among pharmacy students, however, may provide a better understanding of the relationship.

The current study had a few limitations. First, this study was conducted in a single public school of pharmacy in Nigeria. Hence caution should be exercised in extrapolating its results to other pharmacy schools in the country, although the study location had a good blend of students from different ethnic and cultural background. Secondly, the performance of students in clinical pharmacy courses was used as a metric for academic performance in this research. The researchers could not access other students' examination results as at the time of this study.

The results of this study indicated that final-year students of pharmacy have a high incidence of poor quality of sleep, anxiety, and depression. The findings also showed that quality of sleep was negatively linked to anxiety and depression among the participants. On the other hand, the sleep quality had no effect on academic performance. Interventions aimed improving students' sleep quality and mental health are thus recommended. However, the relationship between these variables could be better understood in future studies using a longitudinal study design.

Ethical considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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