Original Article

Subjective Assessment of Sleep Quality, Prevalence and Determinants of Sleep Disorders among Students in Health Science in Burkina Faso, Sub-Saharan Africa

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Abstract

Background: Sleep is crucial for both mental and physical well-being of the general population. Various factors can influence sleep quality and induce sleep disorders in students, a population that is insufficiently studied in the context of Burkina Faso.

Objective: To assess sleep quality and determine the prevalence and factors associated with sleep disorders among students at the "Institut Supérieur des Sciences de la Santé" (INSSA) in Bobo-Dioulasso, Burkina Faso.

Method: This was a descriptive and analytical cross-sectional study among INSSA students during from 11th April to 30th July 2023. Self-completed questionnaires based on the Pittsburg Sleep Quality Index (PSQI), the sleep diary and the Epworth sleepiness scale were used.

Results: A total of 406 students with a mean age of 21.9±1.7 years and a sex ratio of 1.05 were included. Sleep quality was poor (PSQI score >5) in 79.80% of the students, 50.49% had sleep disorders: insomnia (35.96%), daytime sleepiness (17.98%), obstructive sleep apnoea/hypopnoea syndromes (5.42%). The main determinants of these sleep disorders were age<22 years, female gender, BMI>25 kg/m^2, telephone and reading at bedtime, coffee, tea, alcohol consumption, physical inactivity and nocturnal disturbance ($p<0.05$).

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Conclusion: The prevalence of poor quality sleep and sleep disorders is high among health sciences students, with many factors associated with sleep disorders.

Key words: Sleep disorders, sleep quality, prevalence, students, determining factors.

Introduction

Sleep is defined as a periodic and reversible physiological state characterized by a decrease in the state of consciousness and a limitation of perceptual processes[1]. Sleep is a universal biological need that plays an essential role in maintaining and restoring health, and accounts for a third of our lives[1,2]. Sleep, which plays an important role in our lives, contributes to both mental and physical well-being and is a fundamental part of health[3]. Sleep disorders, also known as pathological sleep, are defined as any disturbance in the duration or quality of sleep[2]. The term sleep quality is commonly used in sleep medicine and can refer to a set of sleep measurements, including total sleep time, sleep onset latency, sleep maintenance, total wake time, sleep efficiency, and sometimes sleep-disrupting events such as spontaneous awakening or sleep apnea[4]. Continuous sleep deprivation can have negative consequences for health. Sleep quality can be assessed using both objective and subjective methods. Objective methods such as polysomnography and actigraphy have been shown to be very reliable for obtaining information on sleep parameters[4]. However, these objective methods are not easily accessible in the daily routine and are costly and time-consuming[5]. Among subjective methods, the sleep diary is the most widely used assessment[6].However, its successful use largely relies on daily (prospective) recordings as soon as individuals wake up in the morning, a task that can be difficult to remember, which limits the usefulness of the sleep diary for screening or epidemiological studies. In contrast, retrospective self-report measures, such as questionnaires, can be widely used as they have several advantages, including their low cost and their potential to be administered to several types of populations[7], as these measures are self-explanatory and do not require supervision.

Furthermore, self-assessment questionnaires have the advantage of high patient compliance, ease of administration, and reduced time demand from specialist physicians.

Sleep disorders are a worldwide public health problem. Numerous studies around the world have examined the issue of sleep disorders and found high prevalence[8,9]. Various factors such as long working hours, heavy workloads, environmental and behavioural factors have an impact on sleep quality in the population[10]. University life is a context that can encourage stress. The competitive atmosphere in some programs, the emphasis often placed on grades and performance, and the high pace of university learning can generate constant pressure on students, particularly those in the health sciences[11]. All this leads to a high rate of poor quality sleep and sleep disorders among students[12,13,14,15]. Sleep disorders can have a significant impact on students' academic performance, mental health and quality of life. This is of particular concern in sub-Saharan Africa, where health sciences students often face intense academic and social demands, while being exposed to unique challenges related to the socio-economic environment and limited health infrastructure.

In Burkina Faso, there is no data on sleep disorders among students, and more particularly among health science students. This study was proposed in order to set preventive actions for sleep disorders among the student population, and considering the potential consequences that sleep disorders could have on academic performance as well as physical and mental health. The aim of this study was to assess the quality of sleep, and then, to determine the prevalence and factors associated with sleep disorders in students at the "Institut Supérieur des Sciences de la Santé"(INSSA) at the Nazi BONI University in Bobo-Dioulasso.

Materials and methods

Type of study and study population

This was a descriptive and analytical cross-sectional study from 11th April 2023 to 30th July 2023. The study population consisted of students in medicine and pharmacy at the Institut Supérieur des Sciences de la Santé (INSSA) of the Nazi BONI University in Bobo-Dioulasso, Burkina Faso. Students

who were at least 18 years enrolled at INSSA and gave their informed consent and correctly completed the questionnaire were included in this study.

Sampling strategy

To estimate the sample size, we took into account the risk of error alpha = 5%.

$n = [Z\alpha^2 p (1-p)] / e^2$

n: sample size

Zα: reduced deviation for the 5% alpha risk = 1.96.

e: desired precision of 5%.

p: prevalence

Based on the estimated 40% prevalence of sleep disorders among students from the formula, the minimum sample size was 369 students. In order to account for incomplete filling or non-responses, the final sample size was fixed to 550 students.

Method and Data collection tool

The data were collected using an individual, anonymous, paper-based data collection form with different sections. The first part dealt with the student's identity, including sociodemographic, anthropometric, clinical and lifestyle variables. The second part included a self-questionnaire including items of the validated French version of the Pittsburg Sleep Quality Index (PSQI)[16,17], the sleep diary[18] and the Epworth sleepiness scale[19].

The PSQI was adopted to measure sleep quality[16]. The PSQI scale consists of seven factors: subjective sleep quality, sleep duration, sleep latency, sleep efficiency, sleep disturbances, use of sleep drugs, and daytime dysfunction. The overall score of the PSQI ranges from 0 to 21, with a score of 4 or less indicating good sleep quality, a score of 5–10 indicating fairly good sleep quality, 11–15 indicating fairly bad sleep quality, and a score of 16–21 indicating poor sleep quality. A total score of PSQI over 5 was defined as poor sleep quality[16].

The sleep diary is a self-evaluation tool for nights. It allows you to record a wide range of information, such as the time you go to bed, the time you get up, your naps, the quality of your sleep, the quality of the time you wake up, how you feel during the day[18].

The Epworth Sleepiness Scale (ESS) is a self-administered questionnaire designed to assess subjective sleepiness, for instance the greater or lesser propensity to fall asleep during the day when not stimulated[19].

Statistical analysis

The data collected were entered, processed and analyzed by Epi info software version 7. 2. Quantitative data were expressed as means and standard deviations. Qualitative data were expressed as absolute frequencies and percentages. Graphs were produced using Excel 2016. The statistical test used for comparison was the chi-square test, with a significant p-value when less than 0.05. The qualitative variable was the presence of sleep disorders, and a multivariate analysis using logistic regression was performed to identify the various factors associated with the presence of sleep disorders.

Ethical considerations

This study was conducted under N°2023-174/ MESRI/SG/UNB/SG/DES obtained from the Nazi BONI University on 22nd February 2023. Data was collected and analyzed anonymously and confidentially with the informed consent of the participating students.

Results

Sociodemographic characteristics

Out of a total of 550 questionnaires distributed to medical and pharmacy students during the study period, 495 questionnaires were filled out, 406 of which were correctly completed.

Age

The study population consisted of students aged between 18 and 27 years. The mean age was 21.86 ± 1.74 years.

Sex

Our study population was predominantly male, with 208 (51.23%) students, giving a sex ratio of 1.05.

Level of study

Of the 406 students, Bachelor's degree students accounted for the largest proportion with 246 students (60.59%) (Table I).

Table 1: Distribution of students by level and course of study

Level of study	Participants		Percentage (%)
Bachelor's degree 1	Medicine	55	13.55
	Pharmacy	53	13.05
Bachelor's degree 2	Medicine	35	8.62
	Pharmacy	38	9.36
Bachelor's degree 3	Medicine	32	7.88
	Pharmacy	33	8.12
Master 1	Medicine	25	6.16
	Pharmacy	28	6.90
Master 2	Medicine	17	4.19
	Pharmacy	25	6.16
Doctorate 1	Medicine	35	8.62
	Pharmacy	13	3.20
Doctorate 2	Medicine	17	4.19
	Pharmacy	0	0
Total		406	100

Living environment

Students living in rented flats accounted for the largest proportion, 195 (48.03%) of our study population, 154 (37.93%) lived in halls of residence and 57 (14.04%) with their families.

Anthropometric characteristics

Body Mass Index (BMI)

The vast majority of students, 279 (68.72%) in the study population, had a BMI of less than 25 kg/m². The mean BMI was 22.56 ± 2.68 kg/m².

Pathological history

A total of 186 students (45.81%) had a pathological history. Respiratory disorders were found in 111 students (27.34%), followed by cardiac disorders in 38 (9.36%), psychiatric disorders in 30 (7.39%), hematological disorders in 15 (3.69%), thyroid disorders in 8 (1.97%) and gastrointestinal disorders in 5 (1.23%).

Drug history

In the study population, 55 students (24.63%) used medication related to sleep (anxiolytics, antidepressants, sleeping pills) and 69 students used medication for various pathologies (respiratory, gastric, allergies, etc.).

Sleep habits

Once in bed, the students adopted a number of attitudes. These attitudes were dominated by the use of the telephone in 180 students (44.33%), reading at bedtime in 146 (35.96%), and the use of television in 38 (9.36%).

Lifestyle habits

In our series, 284 students (70%) regularly consumed stimulants, including 3 (0.74%) tobacco, 193 (47.53%) coffee, 153 (37.68%) tea, 60 (14.78%) alcohol, and 2 (0.49%) drugs.

Sports enthusiasts numbered 303 (74.63%) students, of whom 159 (39.16%) practiced sport occasionally, 118 (29.06%) regularly and 26 (6.40%) intensively.

Of the students, 95 (23.40%) felt that they were a nuisance at night.

Sleep quality according to PSQI components

According to PSQI components, subjective sleep quality was perceived as 'very poor' in 59 students (14.53%); sleep onset latency was >60 min in 106 (26.11%); sleep duration was <5 hours in 75 (18.47%), the usual efficiency of sleep was judged to be very poor (<65%) in 42 (10.34%), 205 (50.49%) had sleep disorders, 55 (13.54%) had used sleep medication in the last month and 385(94.83%) presented daytime dysfunction (Table 2).

Three hundred and twenty-four students (79.80%) had poor sleep quality with a PSQI score > 5. The mean PSQI score was 8.91±3.5.

Table 2: Description of sleep quality according to PSQI components

Component	Frequency	Percentage (%)	Score
Subjective sleep quality			1.45
very good	40	9.85	
fairly good	204	50.25	
fairly poor	103	25.37	
very poor	59	14.53	
Sleep latency			1.72
≤ 15 minutes	41	10.10	
between 16 and 30 min	139	34.23	
between 31 and 60 min	120	29.56	
>60 min	106	26.11	
Sleep duration			1.63
>7 hours	37	9.11	
between 6 and 7 hours	153	37.68	
between 5 and 6 hours	141	34.73	
<5 hours	75	18.47	
Sleep efficiency			1.41
>85%	53	13.05	
75-84%	175	43.10	
65-74	136	33.50	
<65%	42	10.34	
Sleep disorders score			0.85
0	201	49.51	
1-9	91	22.41	
10-18	88	21.67	
19-27	26	6.40	
Use of sleep medication			0.31
Not during the past month	351	86.45	
Less than once a week	6	1.48	
Once or twice a week	29	7.14	
Three or more times a week	20	4.93	
Daytime dysfunction			1.54
0	21	5.17	
1-2	207	50.99	
3-4	115	28.32	
5-6	63	15.52	

Prevalence of sleep disorders

Of the 406 students in the study, 205 (50.49%) reported having sleep disorders.

Socio-demographic and anthropometric characteristics of students according to the presence or absence of sleep disorders are listed in Table 3.

Table 3: Distribution of socio-demographic and anthropometric characteristics of students according to sleep disorders

	Sleep disorders			
Characteristics	**YES**	**NO**	**TOTAL**	**p-value**
Age				
< 22 years	160	106	266	$<10^{-6}$
> 22 years	45	95	140	
Gender				
Female	153	45	198	$<10^{-6}$
Male	52	201	253	
Level of study				
Bachelor's degree	153	93	246	$<10^{-6}$
Master-Doctorate	52	108	160	
Living environment				
University city	108	46	154	$<10^{-6}$
Outside university city	97	155	252	
Pathological history				
Yes	99	87	186	0.1568
No	106	114	220	
BMI				
>25kg/m^2	112	15	127	$<10^{-6}$
< 25kg/m^2	93	186	279	

Students' sleep habits according to the presence or absence of sleep disorders are listed in Table 4.

Table 4: Distribution of students' sleep habits according to sleep disorders

	Sleep disorders			
Factors	**YES**	**NO**	**TOTAL**	**p-value**
Phone at bedtime				
Yes	165	15	180	$<10^{-6}$
No	40	186	226	
Bedtime Reading				
Yes	121	25	146	$<10^{-6}$
No	84	176	260	
Television at bedtime				
Yes	26	12	38	0.01048
No	179	189	368	

Students' lifestyle habits according to the presence or absence of sleep disorders are listed in Table 5.

Table 5: Breakdown of students' lifestyle habits according to sleep disorders

	Sleep disorders			
Factors	**YES**	**NO**	**TOTAL**	**p-value**
Tobacco				
Yes	3	0	3	0,06390
No	202	201	403	
Coffee				
Yes	117	76	193	$5.257 \cdot 10^{-5}$
No	88	125	213	
Tea				
Yes	39	21	60	$7.660 \cdot 10^{-3}$
No	166	180	346	
Alcohol				
Yes	42	18	60	$5.223 \cdot 10^{-4}$
No	163	183	346	
Drug				
Yes	2	0	2	NS
No	203	201	404	
Physical sport activity				
Yes	24	79	103	$<10^{-6}$
No	181	122	303	
Nighttime disturbances				
Yes	92	3	95	$<10^{-6}$
No	113	198	311	

NS : Not significant

Main sleep disorders

The main sleep disorders found among the students were: insomnia in 146 students (35.96%), obstructive sleep apnoea/hypopnoea syndromes in 22 (5.42%), daytime sleepiness in 73 (17.98%), parasomnias in 5 (1.23%) and hypersomnias in 3 (0.74%).

Insomnia

The proportion of students suffering from insomnia was 35.96%. This insomnia was of four types: falling asleep in 73 students (17.98%), in the middle of the night in 20 (4.93%), at the end of the night in 16 (3.94%) and the feeling of not having slept in 37 (9.11%).

Sleepiness

Sleepy students represented 73 (17.98%) of the students in the study population. This sleepiness was of three levels according to the rating of the intensity of sleepiness by the Epworth questionnaire: 51 students (12.56%) had normal vigilance, 14 (3.45%) had excessive daytime sleepiness and 8 (1.97%) very excessive daytime sleepiness.

Determinants of sleep disorders in INSSA students

Sociodemographic, anthropometric and environmental factors such as young age < 22 years, female gender, bachelor's degree level, overweight and obesity with a BMI>25 kg/m^2, university residence, phone at bedtime, bed time reading, television at bedtime, tobacco, coffee, tea, alcohol, physical inactivity and night time disturbances determined the presence of sleep disorders in our study population ($p<0.05$)(Table 6).

Table 6: Correlation between sleep disorders and student characteristics

Variables	Adjusted OR a(95% CI)	p value
Age < 22 years	3.187 (2.07-4.905)	$<10^{-6}$
Gender Female	13.14 (8.371-20.63)	$<10^{-6}$
Level of study	3.417 (2.247-5.197)	$<10^{-6}$
Living in university city	3.752 (2.445-5.758)	$<10^{-6}$
Pathological history	1.224 (0.8278-1.809)	NS
BMI>25kg/m^2	14.93 (8,249-27.04)	$<10^{-6}$
Phone at bedtime	51.15 (27.26-95.97)	$<10^{-6}$
Bedtime Reading	10.14 (6.133-16.77)	$<10^{-6}$
Television at bedtime	2.288 (1.12-4.671)	$1.048 \cdot 10^{-2}$
Tobacco	–	NS
Coffee	2.187 (1.47-3,253)	$5.257 \cdot 10^{-5}$
Tea	2.014 (1.138-3.564)	$7.660 \cdot 10^{-3}$
Alcohol	2.62 (1.451-4.731)	$5.223 \cdot 10^{-4}$
Drug	-	NS
Physical inactivity	0.205 (0.1228-0,3414)	$<10^{-6}$
Nighttime disturbances	53.73 (16.63-173,6)	$<10^{-6}$

NS : Not significant

Discussion

The objectives of the current study were to assess sleep quality and determine the prevalence and factors associated with sleep disorders among students at the Institut Supérieur des Sciences de la Santé of Nazi BONI University.

This study reported 79.80%poor quality sleep with a PSQI score > 5 in students who correctly completed the questionnaire. This high prevalence of poor quality sleep was found by Cheng et al. in China, where a prevalence of 54.7% of poor quality sleep was found among students[20]. Nakie et al. in a meta-analysis also found a high prevalence of poor sleep quality among 63.31% of students in Africa[14]. Indeed, university life is a context that can foster stress. The presence of a competitive atmosphere in certain programs, the frequent emphasis on grades and performance, coupled with the fast pace of academic learning, can create constant pressure among students, particularly those in health sciences, and impact the quality of their sleep.[11]. Our higher prevalence than in these studies could be explained by our precarious socio-economic background where health sciences students often face intense academic and social demands, while being exposed to unique challenges related to the socio-economic environment and limited health infrastructure. The students in this study slept less than 6 hours a night, which is below the recommended sleeping time for adults generally averages 7 hours a night. Almojali et al also found this sleep duration to be less than seven hours per night, with an average of 5.8 ± 1.3 hours sleep in their study[21]. Our study was conducted in the last term of the academic year, students tend to revise late into the night in preparation for final assessments, thus disrupting their sleep patterns.

The prevalence of sleep disorders in our study was 50.49%. Sleep disorders were more prevalent among younger students, the majority of whom were undergraduates, among girls, among

students living in halls of residence, and among overweight/obese students ($p<0.05$). Lecoeur had results that corroborate our findings, she found a high prevalence of 65% of sleep disorders, and the same factors as ours were associated with these disorders[13]. On multivariate analysis, sociodemographic and environmental factors such as young age < 22 years, female gender, bachelor's degree level, overweight and obesity with a BMI>25 kg/m^2, university residence, determined the presence of sleep disorders in our study population ($p<0.05$). The main reasons for the predominance of sleep disorders in female subjects were the effect of female hormones on the nervous system, including neurotransmitters such as serotonin and dopamine, which regulate mood and sleep[22]. The second reason is related to girls' sensitivity to hormonal fluctuations, particularly during the menstrual cycle, influencing mood, reactivity to stress and sleep quality[22]. The final reason relates to socio-cultural factors. Indeed, women may also be more likely to report symptoms of anxiety and sleep disorders due to factors such as social expectations of gender roles, which may influence how they express and perceive their own mental health[23]. Overweight and obesity determine the occurrence of sleep disorders due to physical pain associated with difficulties in finding a comfortable sleeping position, associated with emotional disorders such as depression and anxiety, which can disrupt sleep[24].

Once in bed, students adopted a number of attitudes dominated by telephone use in 44.33%, reading at bedtime in 35.96%, television use in 9.36%, all of which could impact sleep and explain the high rate of poor sleep quality and high prevalence of sleep disorders. In multivariate analysis of sleep habits linked to sleep disorders, these facts were found to determine the occurrence of sleep disorders in our study population ($p<0.05$), they were found in several studies[13, 14, 20]. The development and frequent use of digital technologies and data in our context may explain this high prevalence of poor quality sleep. Reading in bed can stimulate the mind, making it more difficult to fall asleep. Light from bedside lamps and other sources can disrupt the production of melatonin, the sleep hormone, signaling to the brain that it's not yet time to sleep. Phones and other electronic devices emit blue light, which inhibits melatonin production, making it harder to fall asleep.

Regarding lifestyle habits, 70% of students regularly consumed stimulants, including 0.74% cigarettes, 47.53% coffee, 37.68% tea, 14.78% alcohol, and 0.49% drugs.

Among the students, 23.40% felt they had a nocturnal nuisance. External or domestic noises, such as traffic, noisy neighbors, snoring or even pets, can disrupt sleep by preventing falling asleep or causing nocturnal awakenings. In multivariate analysis, lifestyle habits such as coffee, tea and alcohol consumption, as well as a sedentary lifestyle, were factors determining the presence of sleep disorders in our study population ($p<0.05$). Consumption of stimulants was found in the majority of studies[13, 14, 20]. As for the low consumption of tobacco and alcohol in our study, it could be explained by socio-cultural and economic reasons. These stimulants consumption influence students' sleep quality. Exam periods are often associated with increased stress and excessive consumption of stimulants, which can lead to difficulty in falling asleep, night-time awakenings and reduced sleep quality.

Students who were physically active accounted for 74.63%. Sedentary lifestyle, was factor determining the presence of sleep disorders in our study population ($p<0.05$). Lack of exercise can contribute to sleep problems by reducing the physiological need for rest. Regular physical activity is linked to improved sleep quality.

Limitations

Our study had some limitations. Indeed, it was a single-center study, and no objective sleep measurements were available, so all responses were obtained from self-assessment tools. However, most of the instruments included in the study were well-validated measures that have been widely used in research on sleep.

Conclusion

Sleep quality was poor in the majority of students and the prevalence of sleep disorders remained high in our study population. We were able to determine the various socio-environmental and behavioral factors that might explain the presence of these disorders in our study population were highlighted in this study. Education on better sleep hygiene and preventive actions for sleep disorders is necessary for these health science students. In the future, an objective assessment would be valuable to better identify sleep disorders and offer solutions to this vulnerable segment of the population to ensure their physical and mental well-being.

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