Original Research Article

PROFILE OF ANXIETY AND DEPRESSION SYMPTOMS ASSOCIATED WITH SLEEP QUALITY OF MEDICALSTUDENTS IN THE EASTERN AMAZON

ABSTRACT

Objective: Anadequatesleepisessential for good mental health. Thus, thisstudyassociatedtheprevalenceofthemainsymptomsofanxietyanddepressionwithsleepquality in medical studentsat a Brazilianuniversity center, a populationfrequentlyaffectedbythesedisorders.

Methods: This is a cross-sectional, descriptive and analytical study, with data obtained through online questionnaires answered by medical students, during the year 2022. To assess symptoms of depression and anxiety, the Hospital Anxiety and Depression Scale (HADS) was used, while, to assess the quality of sleep, thePittsburgh Sleep Quality Index (PSQI).

Results:229 students participated in the study. Of these, 51% had anxiety symptoms. As for depression, 27,5% had depression symptoms. With regard to sleep quality, 28% had poor sleep quality and 71% good quality. There was a significant association between sleep quality and anxiety and depression symptoms ($p<0.001$): of the individuals with good sleep quality, 51% had possible and probably anxiety and 21,2% were classified as possible and probably depression. Furthermore,about the students with poor sleep quality: 80% were possible and probably anxious students and 43,8% were possible and probably depressive.

Conclusions: The study documents a statistically significant association between anxiety and depression symptoms and poor sleep quality. Further multicentric analyzes are needed to understand this scenario.

Keywords:anxiety, depression, sleep, students, medical.

INTRODUCTION

Medical students have always beentarget of several studies that evaluate mental health, due to the greatamount of content to which they are exposed and, consequently, to greater pressure and time dedicated to studies[1]. Thus, such students have a higher prevalence of mental disorders, such as depression and anxiety, when compared to university students from other areas. Their quality of life was also considered worse than that of individuals in the same age group[2].

Furthermore, sleep is one of the most relevant topics nowadays, as there is consistent evidence that deprivation influencesmetabolic and inflammatory processes with significant negative impacts on human health[3,4], and may also act as an early marker ofanxietyand depression[5].In general, medical studentspresentsusceptibility to unsatisfactory sleep, reducing their sleep time to support their academic obligations, corroborating that poor sleep has a higher prevalence in them compared tothe general population[1,2,5].

Researchesindicatesthatsleepdisturbancestendtoco-occurwiththerise in mental healthdisorders in collegestudents. Consideringtheincreasedprevalenceofpoorsleepquality in medical students, especiallyafterthe COVID-19 pandemic[6], littleisknownaboutthecurrentrelationshipbetweensleepqualityand mental health in medical students[7].

Therefore, in viewofthisscenarioandtheincreasingnumberofsleepdisorders, it isnecessarytoincreasethedatabase for aneffectiveunderstandingoftheharmfulrelationshipbetweenthesedisordersand mental healthsymptomstoday, as alreadypointed out byother studies[8]. Therefore, thepresentstudyaimedtoestablishtheprevalenceandrelationshipbetweenanxietyand depressionsymptomsandsleepquality in medical studentsat a university center in northernBrazil.

METHODS

Study Design

Thisstudyis a cross-sectional, analytical and observational study to obtain data through the questionnaires answered by students enrolled in the Medicine Course of the University Center of the State of Pará-Brazil, in the year 2022. From this, it was analyzeddata on the prevalence of anxiety and depression symptoms in medical students and compared them with sleep quality scores, seeking to identify possible relationships between these conditions.

Data collection through questionnaires was authorized by the center, through approval by the Institution'sResearchEthicsCommittee.The questionnaireshad 3 sections, thefirstonewithsociodemographicquestions, thesecondwiththeHospital AnxietyandDepressionScale (HADS)andthethirdwiththePittsburgh SleepQuality

Index (PSQI), whichwillbediscussed later. In addition, data collection was authorized by the students, by signing the Informed Consent Form contained on the first page of the questionnaire.

Sample Selection

This analysis included all medical students from the university center, from the 1st to the 12th semester, who agreed to answer the questionnaires and who signed the Informed Consent Form. Exclusion criteriawerenotadopted.

The study'suniversity medical center hasabout 50 studentseachsemester. However, consideringdropouts, failuresandothervariables, 48 studentswereconsidered per class. Thus, totaling 576 studentsenrolledandobtaining a calculatedsamplesizeof 231 students, with a confidencelevelof 95% and a marginoferrorof 5%.

In the second section of the questionnaire, there were sociodemographic questions, such as age, gender and stage in the medical school.To approach theparticipants, thecalculatedsamplevalueof 231 studentswasconsidered, and a stratifiedrandomsamplewaschosenwith a minimumobjectiveof 19 students in eachsemester, whowereapproachedduringtheiracademicactivitiesbytheresearchers. However, giventhedifficulties in findingyoungerstudents, thecollectionincluded 17 studentsfromthefirst 4 semesters, 18 fromthe 5th semester, 19 fromthe 6th, 7th and 8th semesters, in additionto 22 fromthe 9th semesterand 21 fromthe 10th, 11th semestersand 12.

The studentswereconsidered per biennium, as the medical education in Brazil is divided into stages, with the first two years considered the "basic cycle", years 3 and 4 the "clinical cycle", and years 5 and 6 "internship", usually composed exclusively of internships and practices.

Data Collection and Analysis

To subjectively assess sleep quality, an excellent recognized tool isthe “Pittsburgh Sleep Quality Index (PSQI)” of 1989[9].The questionnaire evaluates seven sleep components: subjective quality of sleep, sleep latency, sleep duration, sleep efficiency, sleep disorders, medication use, and daytime dysfunction. The score can range from 0 to 3 for each component, with a maximum total score of 21 points. Scores below 5 indicate good quality of sleep and above that indicate poor quality of sleep.This index was validated for the Portuguese language[10] and is considered accessible to identify sleep quality, identifying whether individuals sleep well, poorly or have sleep disorders[11]. The PSQI showed strong reliability, with moderate structural validity in different samples, suggesting that the tool fulfills its intended utility[12].

To assess symptoms of anxiety and depression, the Hospital Anxiety and Depression Scale (HADS)[13] validated for the Portuguese language[14] was used. The scale evaluates subjective symptoms of anxiety and depression and does not confirm these diseases or even replace the evaluation of a specialist professional. The HADS consists of 14 items divided into two subscales, 7 questions to assess depression and 7 to assess anxiety. Each item is scored from 0 to 3, with a maximum score of 21 for anxiety or depression. The recommended scores according to Zigmond and Snaith[13] are 8 to 10 for possible cases and ≥11 for probable cases. Scores less than 7 indicate non-cases.

The choice to use the HADS scale was due to its easy completion, which allowed for quick and reliable data collection, and the great advantage of the absence of confusing symptoms common between clinical illnesses and depression or anxiety, such as fatigue, loss of appetite and sleep disturbances[15]. Furthermore, the scale proved to be potentially effective and applicable for screening and detection of mild anxiety and depression disorders[16,24,25].

Data were collected through online questionnaires after Institution's Research Ethics Committee approval, from June to August 2022. They were organized in Microsoft Excel 2010. Graphs and tables were built with the tools available in Microsoft Word, Excel and Bioestat 5.5 programs.

All tests were performed using the Bioestat 5.5 software. Quantitative variables were described by frequency and percentage. 95% confidence intervals were calculated for the proportion to infer how the prevalences behave in relation to the population from which they were obtained. The independence or association between two categorical variables was tested using the chi-square or Fisher's exact test, depending on the case, and significant associations were detailed using the analysis of standardized residues, to identify the categories that most contributed to the result. Results with $p \leq 0.05$ were considered statistically significant.

RESULTS

A total of 229 students were included in the study,7 students refused to participate. Most of whom (142 or 62%) were female and 37.6% were male. Most (142 or 62%) were aged between 21 and 25 years and 25.3% of individuals were aged between 17 and 20 years (Table 1).

Considering the students per biennium, 37.6% of the individuals were from the 9th to the 12th semester, 75 individuals (32.8%) were from the 5th to the 8th semester and 86 (37.6%) were from the 9th to the 12th semester (Table 1).

Table1- Sociodemographic characteristics of the students, evaluated from June to August 2022, Belém-Pará.

Variable	Frequency	Percentage
Sex		
Female	142	62.0
Masculine	86	37.6
Other	1	0.4
Age		
From 17 to 20 years old	58	25.3
From 21 to 25 years old	142	62.0
From 26 to 30 years old	20	8.7
Biennium in the medical school		
1st to 2ndyear	68	29.7
3rd to 4th year	75	32.8
5th to 6th year	86	37.6

Percentages are relative to the total number of participants (n=229).

As for the classification of anxiety and depression symptoms, 94 individuals (41%) had an improbable classification of anxiety and 37.6% of individuals had possible anxiety. Most (166 or 72.5%) had unlikely depression, 49 subjects (21.4%) had possible depression, and 6.1% (14 subjects) had probable depression. 64 (27.9%) had poor quality sleep. The narrower this interval is, the greater the certainty related to that prevalence in the population from which this sample was obtained (Table 2).

Table 2- Classification regarding anxiety and depression (HADS) and sleep quality (PSQI) of the students, evaluated from June to August 2022, Belém-Pará.

Variable	Frequency	Percentage	CI95%
Anxiety Classification (HADS)			
Unlikely	94	41.0	34.7 - 47.7
Possible	86	37.6	31.3 - 44.2
Likely	49	21.4	16.4 - 27.4
Depression Classification (HADS)			
Unlikely	166	72.5	66.1 - 78.1
Possible	49	21.4	16.4 - 27.4
Likely	14	6.1	3.5 - 10.3
Sleep Quality (PSQI)			
Good sleep	165	72.1	65.7 - 77.7
bad sleep	64	27.9	22.3 - 34.3

Percentages are relative to the total number of participants (n=229). 95% CI: 95% confidence interval for the prevalence.

Table 3 showed the association between sleep quality (PSQI), age, gender and stage in the medical school. In individuals with good sleep quality, most (104 or

63%) were aged 21 to 25 years and 26.1% of individuals were aged 17 to 20 years. In the group with poor sleep quality, more than half (38 or 59.4%) were aged 21 to 25 years and 23.4% of subjects were aged 17 to 20 years. However, these observed differences did not reach statistical significance (p=0.353). Sleep quality and sex were significantly associated (p=0.007): of the 64 individuals with poor sleep quality, 78.1% were female, in a higher proportion than expected; of the individuals with good sleep quality, 43.6% were male, a higher proportion than expected by the statistical test. That is, the quality of sleep among women was significantly worse. Furthermore, according to the data obtained, sleep quality and stage in the medical school were not significantly associated (p=0.064).

Table 3- Association between age, gender and stage in the medical school with sleep quality of the students, evaluated from June to August 2022, Belém-Pará.

Variable	Good Sleep (n=165)	Bad Sleep (n=64)	p-value
Age			0.353
From 17 to 20 years old	43 (26.1)	15 (23.4)	
From 21 to 25 years old	104 (63.0)	38 (59.4)	
From 26 to 30 years old	11 (6.7)	9 (14.1)	
From 31 to 39 years old	7 (4.2)	2 (3.1)	
Sex			0.007
Female	*92 (55.8)**	*50 (78.1)†*	
Masculine	*72 (43.6)†*	*14 (21.9)**	
Biennium in the medical school			0,064
1st to 2ndyear	56 (33,9)	12 (18,8)	
3rd to 4th year	49 (29,7)	26 (40,6)	
5th to 6th year	60 (36,4)	26 (40,6)	

Categorical variables are displayed as n (%). The percentages are relative to the total of each column. In all cases, the chi-square was used. *: this frequency was lower than what would be expected by chance. †: this frequency was higher than expected.

Table 4 showed the association between sleep quality, anxiety classification and depression classification. There was a significant association between sleep quality and anxiety (p<0.001): of the individuals with good sleep quality, 81 (49.1%) had improbable anxiety, this proportion being higher than expected by the statistical test; of the 64 individuals with poor sleep quality, 24 (37.5%) were likely, this proportion being higher than expected by the statistical test. There was also a significant association between sleep quality and depression (p<0.001): of the individuals with good sleep quality, 130 (78.8%) were classified as unlikely depression, in a higher proportion than expected; in terms

of poor sleep quality, 9 (14.1%) were likely to have depression, with this proportion being higher (†) than expected.

Table 4- Association between anxiety classification (HADS), depression classification (HADS) and sleep quality of the students, evaluated from June to August 2022, Belém-Pará.

Variable	Good Sleep (n=165)	Bad Sleep (n=64)	p-value
Anxiety Classification (HADS)			<0.001
Unlikely	*81 (49.1)†*	*13 (20.3)**	
Possible	59 (35.8)	27 (42.2)	
Likely	*25 (15.2)**	*24 (37.5)†*	
Depression Classification (HADS)			<0.001
Unlikely	*130 (78.8)†*	*36 (56.3)**	
Possible	30 (18.2)	19 (29.7)	
Likely	*5 (3.0)**	*9 (14.1)†*	

Categorical variables are displayed as n (%). The percentages are relative to the total of each column. In all cases, the chi-square was used. *: this frequency was lower than what would be expected by chance. †: this frequency was higher than expected.

DISCUSSION

In this study, it was identified that 37% of students had possible anxiety, while 21% had probable anxiety[17]. As for depression, 21.4% of individuals had possible depression and 6.1% probabledepressionA recent meta-analysisshowedthat 33.6% ofstudentshaddepressivesymptoms, while 39% hadanxiety symptoms[18], being more compatiblewiththeresultofpossibleanxietyanddepression. Furthermore, another study showed, using the HADS, that medical students had symptoms of anxiety and depression at a prevalence of 20% and 7% respectively[17,19], whichisconsistentwiththe "probabledepressionandanxiety" resultsfound in thepresentstudy.

In a recent meta-analysis, it wasidentifiedan overall prevalence rate ofanxietyamongBrazilianundergraduatestudentsof37,7% and a prevalenceofdepressionof 28,51%[20]. A later Brazilian meta-analysishasalreadyshown similar compatibility in medical students, with 30.6% for depressionand 32.9% for anxiety[21]. Thus, although the sample of the present study is small, of a unicentric nature, and there are different screening tools for these conditions, it was possible to identify similarity with the values obtained in relation to the classification of possible anxiety and depression, guaranteeing reliability in the screening of the symptoms of these conditions through HADS.

When considering the extensive workload demanded in the medical course, many students find the availability to study at night, thus reducing the number of hours reserved for sleep[6,22]. In addition, the impairment of the quality of this sleep due to the stressors of medical graduation, such as study overload, high competitiveness, responsibility and expectations associated with the physician's role, is analyzed[6,22-24]. Such contexts become alarming and are connected, since sleep disorders increase the incidence of psychiatric disorders, in addition to reducing the professional and academic performance of individuals[24].

Thus, anxiety symptoms are associated with more sleep disorders and the use of sleeping pills[25-29], with proven polysomnographic changes in these individuals[26]. In the present study, there was a significant association between anxiety symptoms and poor sleep quality ($p<0.001$), in which 37.5% were probable and 42.2% possible anxious individuals with poor sleep quality. With that in mind, adding these values, about 80% of medical students with anxiety symptoms had poor sleep quality.

In other studies[27-29], poor sleep quality was associated with anxiety and depression. In the present study, which also showed a relevant association($p<0.001$), 29.7% had probable depression and 14.1% possible, totaling 43.8% of the total number of students with depressive symptoms and poor sleep quality.

In this sense, understanding that insomnia can behave as a predictor of anxiety[30] and depression[30-32]and that it can also be a symptom of both disorders - according to the DSM-5[33]- it becomes difficult to establish a direct causal relationship. However, it is proven that cognitive-behavioral therapy for sleep disorders improves mental health and the severity of symptoms in patients with mental disorders, including depression[34]; making sleep treatment an important front not only for the prevention but also for the treatment of these disorders.

Although the study did not identify a significant association between sleep quality and stage in the course or age, sleep quality and gender were significantly associated ($p=0.007$): of the 64 individuals with poor sleep quality, 78.1% were from the women. Other studies point to this same factor, in which they confirm thatsleep disturbances, mainly insomnia, are more prevalent among women due to behavioral aspectsandbiological constitution[27,35-37].

In spiteofthefactthat medical studentshavenaturally high rates of mental distressandsleepdisturbances, thisscenariohasbecome more alarmingrecentlywiththe COVID-19 pandemic[38-39]. The presentstudyandthevaluesfoundprobablyhadanimportantimpactfromthepandemic, but it wasnotevaluated. OneBrazilianstudyalsoshowedconcernaboutthe negative impactof COVID-19 on medical educationandthegenerationof medical jobs, whichcanalsodirectlyworsensleep quality[40].

Other markers of mental suffering, such as burnout syndrome, also deserve attention in the medical field. This syndrome occurs not only in students, but also in medical residents, whoperpetuatethese disorders[41,42]. A recent Brazilian

study with resident physicians exposed relevant prevalence of anxiety, depression and burnout, identifying similar patterns and individual and environmental common factors, such as high workloads, occurrence of psychological abuse, poor supervision of the faculty, unsatisfactory learning experience and conflicts between workandpersonal life[43].

As for the limitations of the study, the use of scales is listed, in which both the HADS - although it suggests, does not confirm anxiety or depression - and the PSQI are subjective tools and can be influenced by memory, inattention or even dishonestyoftheparticipants. In addition, thedifferent scales and other ways of evaluating these disorders used in the studies end up making a completely reliable comparative analysis difficult. It is also possible to point out the failure to establish causality and other confounders associated with sleep quality and/or symptoms of anxiety and depression. Finally, the unicentric character of the study may limit the interpretationoftheresults.

CONCLUSION

In summary, the data from this study contemplate what was outlined as an objective, significantly supporting the harmful relationship between mental health disorders, depression and anxiety, and poor sleep quality. With regard to sociodemographic characteristics, the study also showed a statistically significant association between poor sleep quality and female gender.

The data obtained are relevant for the definition of intervention models, applying them after recognizing the variables that interfere in the connection between mental health disorders and, consequently, bad sleep quality. Further multicenter analyzes are needed to understand this scenario in medical schools around the world.

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