

Quality of sleep and excessive sleepiness among medical students

Qualidade do sono e sonolência excessiva entre estudantes de medicina

Rodrigo Rufino Pereira Silva¹, Thaise de Abreu Brasileiro Sarmento²,
Ankilma do Nascimento Andrade Feitosa³, Luciana Modesto de Brito⁴

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ABSTRACT: *Introduction:* The demands of the academic life of medical students can alter their quality of life, mainly due to the heavy course load. Understanding the importance of sleep and its impact on the students lives' quality, we emphasize the importance of measuring this parameter. *Objective:* To evaluate the perception of medical students on the quality of their own sleep and the degree of excessive daytime sleepiness, comparing the different stages of the course. *Method:* This is a cross-sectional and analytical study with 234 students from the 1st to the 6th year of the undergraduate medical course of a university in the region of the *alto sertão paraibano*. The Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale were used for measurement. Both questionnaires are validated for use in Brazil. *Results:* The mean sleep duration in the overall sample was 6.92 hours. Of the 234 respondents, 64.5% (n = 149) had poor sleep quality or a sleep disorder and at least 21% reported using sleeping pills. Most of the participants reported a sleep duration of 7 hours or less (58.6%). The analysis of the data obtained by the Epworth Sleepiness Scale showed that 55.55% (n = 130) of the students had excessive daytime sleepiness that should be investigated. *Conclusion:* It was observed that most medical students had sleep deprivation, which was associated with excessive sleepiness and poor sleep quality, indicating the need for preventive actions in this regard. The results point to the relevance of investing in efforts to correct this trend. It is necessary to implement health promotion measures for higher education students.

Keywords: Sleep wake disorders; Students, medical; Sleepiness; Disorders of excessive somnolence.

RESUMO: *Introdução:* A demanda acadêmica a que são submetidos os alunos do curso de graduação em Medicina tende a alterar sua qualidade do sono, em virtude principalmente da carga horária elevada do curso. A partir do entendimento da importância do sono e de seu impacto na qualidade de vida do estudante é que ressalta-se a notabilidade dessa mensuração. *Objetivo:* Avaliar a percepção que o estudante de medicina tem acerca da qualidade do próprio sono, bem como o grau de sonolência diurna excessiva, comparando as diferentes fases do curso. *Métodos:* Trata-se de um estudo transversal e analítico envolvendo 234 acadêmicos do 1º ao 6º ano do curso de graduação em Medicina de uma faculdade do alto sertão paraibano. Utilizou-se para mensuração o Índice de Qualidade do sono de Pittsburgh e a Escala de Sonolência de Epworth, ambos questionários validados para uso no Brasil. *Resultados:* A média global de horas de sono por noite foi de 6,92 horas. Dos 234 entrevistados, 64,5% (n = 149) apresentaram qualidade ruim de sono ou distúrbio deste e pelo menos 21% relataram fazer uso de medicação para dormir. Viu-se ainda que a maior parte da amostra apontou que dorme 7 horas ou menos por noite (58,6%). A análise dos dados obtidos pela Escala de Sonolência de Epworth demonstrou que 55,55% (n = 130) dos estudantes tinham sonolência diurna excessiva que deve ser investigada. *Conclusão:* Foi observado que a maioria dos graduandos em Medicina apresentou privação de sono associada consequentemente à sonolência excessiva e à qualidade ruim de sono, indicando necessidade de ações preventivas neste sentido. Os resultados apontam, nesse caso, para a pertinência do investimento em esforços para a correção dessa tendência. Fazem-se necessárias medidas de promoção de saúde entre a população de estudantes do ensino superior.

Descritores: Transtornos do sono-vigília; Estudantes de medicina; Sonolência; Distúrbios do sono por sonolência excessiva.

Trabalho realizado com alunos do curso de Graduação em Medicina da Faculdade Santa Maria – FSM – Cajazeiras, PB – Brasil.

1. Estudante do Curso de Graduação em Medicina da Faculdade Santa Maria – FSM - Cajazeiras, PB. <https://orcid.org/0000-0003-0428-0305>. E-mail: rd_ro@hotmail.com.
2. Professora do Departamento de Pediatria do Curso de Graduação em Medicina da Faculdade Santa Maria – FSM - Cajazeiras, PB. <https://orcid.org/0000-0003-0390-805X>. E-mail: thaiseabreu@hotmail.com.
3. Doutora em Ciências da Saúde pela Faculdade de Medicina do ABC. Professora adjunta do Curso de Graduação em Medicina da Faculdade Santa Maria – FSM - Cajazeiras, PB. <https://orcid.org/0000-0002-4751-2404>. E-mail: ankilmar@hotmail.com.
4. Professora do Departamento de Clínica Médica do Curso de Graduação em Medicina da Faculdade Santa Maria – FSM - Cajazeiras, PB. <https://orcid.org/0000-0003-1050-0239>. E-mail: lucianamodesto@hotmail.com

Endereço para correspondência: Secretaria do curso de Graduação em Medicina da Faculdade Santa Maria. BR. 230, Km 504 – Bairro Cristo Rei. Cajazeiras, PB. CEP: 58900-000.1 0974. E-mail: rd_ro@hotmail.com.

INTRODUCTION

Sleep is a vital process, crucial for maintaining homeostasis. Adequate sleep has a fundamental biological role in several processes, such as memory and regulation of body energy^{1,8}. Changes in sleep quality have been associated with depression, anxiety^{2,3} and abuse of central nervous system stimulants among medical students in Brazil⁴.

Subjective and quantitative aspects of sleep quality in medical students have been the focus of scientific research⁵⁻⁷. Studies in this population tend to demonstrate sleep deprivation, which is associated with heavy academic workload and tasks in multiple activities. This can have a significant impact on the quality of life of these students. Sleep deficits are thought to be related to decreased productivity, cognitive deficit, demotivation and impaired health⁸.

Sleep deprivation also affects stress regulation. It is interesting to observe the increase in cortisol levels in sleep-deprived individuals. The serum levels of cortisol are down regulated during the day, reaching the lowest level at the beginning of sleep. Sleep deprivation causes changes in cortisol regulation, which leads to higher serum levels on the following night⁹.

Seeing that sleep disturbances can negatively affect the life of the university student, it is important to evaluate the sleep quality of medical students. With this objective, the literature contains instruments for the self-report of sleep quality, such as the Pittsburgh Sleep Quality Index (PSQI)¹⁰ which consists of 19 items that address topics ranging from sleep duration to use of sleeping pills, and the Epworth Sleepiness Scale (ESS)¹¹, composed of eight statements on daytime sleepiness in everyday situations, according to the individual's way of life in the recent weeks.

Both instruments used in the present study were validated and translated into Brazilian Portuguese, have high efficacy (80% specificity and 68.8% sensitivity in the PSQI)¹², and are recommended for use both in clinical practice and in scientific research. Thus, the objective of the present study was to evaluate the perception of sleep quality and the degree of excessive daytime sleepiness among medical students, comparing the phases of the course through the application of the PSQI and the ESS.

METHOD

This is a cross-sectional and analytical study, carried out through the application of individual questionnaires. The study was carried out with all the students of the undergraduate medical course of a university in the region "Alto Sertão Paraibano", in the state of Paraíba. The population consisted of 341 students distributed in the 12 semesters of the undergraduate medical course at the time

of the application of the questionnaires. There was no sample calculation, as the sample was represented by the population (excluding only those who did not accept to participate, those excluded by exclusion criteria and those who completed the questionnaire incorrectly).

The inclusion criteria were all students enrolled in the institution's medical course who were over 18 years old, who answered the entire PSQI and ESS forms during the period established and who signed the Informed Consent Form (TCLE).

Students who declined the invitation to participate in the research or did not complete the questionnaires correctly were excluded. Data was collected at the beginning of the academic semester, during the months of August and September 2018, and the questionnaire was applied during breaks or before the beginning of classes. The applicator read the informed consent form and the students signed it. The present study was assessed and approved by the ethics committee for research involving human beings of the institution, under protocol n° 2.713.703/2018.

Two self-administered questionnaires were used: the PSQI¹⁰ and the ESS¹¹, both translated and validated for use in Brazil¹². The PSQI is used to assess subjective sleep quality and is composed of 19 items grouped into seven components, which are scored on a scale from zero to 3. The components evaluated are: 1. Subjective sleep quality; 2. Sleep latency; 3. Sleep duration; 4. Habitual sleep efficiency; 5. Sleep disturbances; 6. Use of sleep medications; and 7. Daytime dysfunction associated with the sleep-wake cycle.

The scores for the seven components of the PSQI are summed to yield a global score ranging from 0 to 21. Scores from zero to five indicate good sleep quality, scores greater than or equal to 6 indicate poor sleep quality and scores above 10 indicate sleep disturbance.

The ESS is a simple questionnaire with 8 items rated from zero to 3 points according to the intensity of sleepiness. Each item presents a particular situation to assess the chance of falling asleep during the activity. Then, the scores from the 8 items are summed. Higher scores indicate higher propensity to fall asleep. The total possible points are 24, and scores ≥ 11 indicate excessive daytime sleepiness. These instruments were selected for this research because they are analysis tools that are known worldwide and are validated for the assessment of sleep disorders.

The data obtained in the questionnaires were stored in tables in Microsoft Excel. Then, the data were inserted into a database in the program Statistical Package for Social Sciences (SPSS), version 20.0 for Windows, for further analysis. In this study, the semesters were grouped according to the traditional cycles of the medical course. The results were described considering the overall group and the comparison between the groups in the three cycles: Basic Cycle (BC), with students in the 1st and 2nd years

of the course; Clinical Cycle (CC), with students in the 3rd and 4th years; and Internship Cycle (IC), with students in the 5th and 6th years. Chi-square and ANOVA tests were performed for the analysis of statistical significance. In this study, p-values < 0.05 were considered significant.

RESULTS

Of the 341 students distributed in the 12 semesters of the undergraduate medical course when the questionnaires were applied, 279 agreed to participate, representing 81.81% of the students enrolled. Among these, 45 were excluded due to incomplete and/or improper questionnaire responses. The final sample was composed of 234 participants, which represents a percentage of 68.62% of the students of the course. The mean age was 23.4 years, with a standard deviation (SD) of 4.611. Table 1 shows the profile of the participants, which were grouped according to the cycles.

Table 1. Distribution of the sample by undergraduate cycle and by gender

Characterization of the sample		Students; no. (%)
Groups	Group BC	137 (58.5)
	Group CC	78 (33.3)
	Group IC	19 (8.2)
Gender	Male	121 (51.7)
	Female	113 (48.3)

Source: Data from this study; BC: Basic Cycle; CC: Clinical Cycle; IC: Internship Cycle

In the overall sample, 47.6% of participants scored 6 to 10 points, which indicates poor sleep quality, and 16.9%

scored 11 or more, which indicates a sleep disorder that should be investigated. The PSQI results were analyzed in the overall sample (Table 2) and in the three groups, according to the questionnaire components (Table 3).

Table 2. Final global analysis of the PSQI components

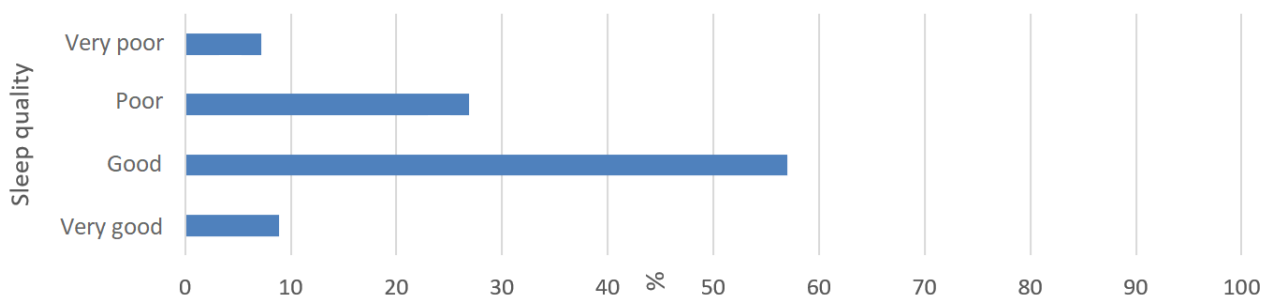
Sleep Quality – PSQI	%	N
Good (0 to 5 points)	35.5	82
Poor (6 to 10 points)	47.6	110
Sleep disorder (≥ 11 points)	16.9	39
Total	100.00	234

Source: Data from this study

Overall, the mean PSQI score was 7.09 (SD = 2.520). In the analysis by group, the mean PSQI score was 7.15 (SD = 2.538) in the BC, 7.04 (SD = 2.778) in the CC and 6.89 (SD = 2.622) in the IC. The p-value in the comparative analysis of the PSQI was 0.890. The comparison between the groups showed that 75.6% of the students in the BC, 63.6% of the students in the CC and 68.4% of the students in the IC scored 6 points or more in the PSQI, which indicates poor sleep quality or sleep disorder. Pearson’s Chi-square value was 0.18.

The first component of the PSQI assesses the student’s perception of their sleep quality. In this sense, an interesting finding was that, subjectively, 65.9% of the participants rated their sleep quality as very good or good, while 34.1% classified it as very poor or poor (Graph 1). This leads us to believe that students overestimate the quality of their own sleep, as, according to Table 2, only 35.5% of students actually have a good sleep quality (maximum score of 5 on the PSQI).

Graph 1. Subjective evaluation of sleep quality



Source: Data from this study

Sleep latency was longer than 15 minutes for most of the participants in each group (Table 3). As for the third component evaluated, our study showed that, overall, the mean duration of sleep was 6.92 hours (SD = 1.239) and 58.6% of participants reported sleeping less than 7 hours a night. Regarding the different cycles, the mean duration of sleep in BC, CC and IC was respectively 7.04 (SD = 1.278), 6.7 (SD = 1.179) and 6.97 (SD = 1.124). The comparison between the groups did not reveal statistically significant differences (p-value = 0.15). The habitual sleep efficiency was over 85% for 67% of the participants in BC, 64% of the participants in IC and 57% of the participants in IC.

Most of the students denied the use of sedatives (79%, n=185). The analysis by group did not show significant differences regarding the use of these

substances at least once a week (around 20% and 25% for the 3 groups). Among those who reported using these, 14 took them more than three times a week, which is a considerable amount (6% of the total).

Finally, of the 7 components evaluated in the PSQI, the most statistically significant (p = 0.003) was daytime dysfunction. In this component, the respondent is asked how often they have trouble staying awake during daily activities or keeping up enthusiasm during the day. The group with the highest rate of severe dysfunction was group CC with 22%, followed by BC with 12% and CB with 5%. In this study, most of the sample (53.9%) reported having moderate or severe difficulty to stay awake during the day.

Table 3. Results of PSQI components according to cycles and components

PSQI	Group BC (N = 137) 58.5%	Group CC (N = 78) 33.3%	Group CI (N = 19) 8.2%	n	%	
Subjective sleep quality						
Very Good	12	7	2	21	8.9	P = 0.921
Good	77	44	12	133	57.0	
Bad	38	20	5	63	26.9	
Very Bad	10	7	0	17	7.2	
Sleep latency						
≤ 15 min	40	23	3	66	28.3	P = 0.520
16 to 30 min	64	30	9	103	44.0	
31 to 60 min	18	17	5	40	17.0	
60 min	15	8	2	25	10.7	
Sleep duration						
> 7 hours	53	36	8	97	41.4	P = 0.648
6 to 7 hours	65	34	8	107	45.7	
5 to 6 hours	13	4	3	20	8.5	
< 5 hours	6	4	0	10	4.4	
Habitual sleep efficiency						
> 85%	92	50	11	153	65.3	P = 0.740
75% to 84 %	33	22	5	60	25.7	
65% to 74%	8	2	2	12	5.1	
< 65%	4	4	1	9	3.9	
Sleep disturbances						
0	2	2	2	6	2.5	P = 0.184
1 to 9	94	61	15	170	72.6	
10 to 18	39	13	2	54	23.1	
19 to 27	2	2	0	4	1.8	

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Table 3. Results of PSQI components according to cycles and components

PSQI	Group BC (N = 137) 58.5%	Group CC (N = 78) 33.3%	Group CI (N = 19) 8.2%	n	%	
Use of sleeping medication						
Not even once a week	108	63	14	185	79.0	P = 0.168
Less than once a week	12	5	5	22	9.5	
Once or twice a week	8	5	0	13	5.5	
Three or more times a week	9	5	0	14	6.0	
Daytime disfunction						
None - 0	17	3	2	22	9.4	P = 0.003
Mild - 1 a 2	45	32	9	86	36.7	
Moderate - 3 a 4	58	26	7	91	38.9	
Severe - 5 a 7	17	17	1	35	15.0	

Source: Data from this study; BC: Basic Cycle; CC: Clinical Cycle; IC: Internship Cycle

Regarding the Epworth Sleepiness Scale (ESS), the analysis of the data showed that 55.5% (n = 130) of the students had a score of 11 or more, which indicates excessive daytime sleepiness that should be investigated (Table 4). The comparison between the groups showed that excessive daytime sleepiness was present in 45% of the BC

group, 48% of the CC Group and 26% of the IC Group.

There were no statistically significant differences in relation to ESS and gender (p = 0.120), the basic cycle (p = 0.295), the clinical cycle (p = 0.704) or the internship cycle (p = 0.270), which demonstrates once again the homogeneity of the groups in relation to the parameters used.

Table 4. Excessive daytime sleepiness according to the Epworth Sleepiness Scale

Score	Meaning	%	n
0-6	Normal	19.65	46
7 to 10	Borderline	23.07	54
11 to 15	Excessive Daytime Sleepiness	42.3	99
16 to 19	Excessive Daytime Sleepiness	12.39	29
20 or more	Excessive Daytime Sleepiness	0.85	2
Total		100.0	234

Source: Data from this study

DISCUSSION

Sleep quality among medical students is a topic that has been studied both in Brazil and around the world, especially considering how it can affect the quality of life of this population. In this study, 68.62% of the medical students in the institution were successfully interviewed, a rate that is similar to other studies with this group^{5,8}

The overall sample of this study had a mean of 6.92 hours of sleep a night, which is lower than the mean sleep duration in the general adult population (seven to nine hours)¹³, but higher than the values found in other studies with the same population, with means of 6.13h in Goiás⁶, 6.8h in São Paulo¹⁴ and 6.48h in Argentina¹⁵. It is important to note that there was no significant difference

regarding sleep duration between the groups analyzed (BC, CC and IC).

The analysis of sleep quality using the instruments described in this study showed that 64.5% of the sample (n = 149) scored more than 5 points in the PSQI. This rate differs from those found among students of the Federal University of Acre (76.1%)⁸ and students in the city of Botucatu – SP (87.1%)⁵ and is similar to that found in a study carried out in Southern Santa Catarina, in which 64.7% of medical students had scores over 5¹⁶. In our study, the comparative analysis between the groups in relation to the PSQI did not reveal statistically significant differences, which shows a degree of homogeneity between the groups evaluated.

An interesting fact was that students overestimate

the quality of their own sleep. When interviewed, only 34.1% reported poor or very poor sleep quality, when in fact 64.5% had poor sleep quality or sleep disorders, as they scored more than 5 points in the PSQI. This demonstrates the discrepancy between self-perception of sleep quality and reality. It is believed that this issue is enhanced by the fact that the problem is not recognized, when it is well known that the quality of sleep in medical students is worse than in the general population¹⁷

Undoubtedly, one of the most unexpected and worrying results of this study was the significant proportion of medical students who reported using sedative-hypnotic drugs to sleep at least once a week in the month prior to the application of the questionnaire. In this study, this rate was 21%, which was higher than the rates in other studies in the literature, which found values such as 7.01%¹⁴, 8.6%⁵ and 9.0%⁷. The current concern with the increase in the use of sleeping pills among students is related to the risk of drug addiction and the side effects from the abuse of these substances.

Excessive daytime sleepiness was found in 55.55% of the sample. It is interesting to note that this rate is close to values found in other studies: 49.8%¹⁸ and 47.1%²⁰. The most common cause of excessive daytime sleepiness is chronic sleep deprivation. The amount of sleep required varies individually and seems to be genetically determined¹⁹.

One of the limitations of this study is that variables that can influence the occurrence of sleep disorders (such as preparing for selection processes, conflicts in the family, eating habits, physical activities) were not analyzed. However, it is important to understand the dimension of the problem. Poor sleep quality in medical students should be a constant concern for everyone involved, as it can have negative effects, such as decreased academic performance and attention^{21,22} and increased prevalence of common mental disorders such as attention deficits, difficulty making decisions, irritability, and fatigue²³.

It is certainly relevant to discuss not only technical

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aspects, but also the subjective aspects of the topics addressed. How can we analyze the data provided by this study? How can we apply these data in a practical way in the daily life of medical students? How can we define to what extent more awake time means more production? One of the objectives of this study was to provide data for these discussions.

There is certainly a deficit in sleep quality among medical students. Not only did our study reveal this, but also several others mentioned above have come to the same conclusion. Considering this fact and knowing its negative effects, substantial changes should be proposed. It is not acceptable to sacrifice the mental health of students for the possibility of greater academic performance. It is contradictory to speak of health and well-being, in a course that is mainly about health promotion and, behind the scenes, sacrifice good health for an expectation of greater academic performance, which is often not even achieved, as mental fatigue unavoidably leads to decreased production.

FINAL CONSIDERATIONS

This study found a predominance of poor sleep quality in the group of students evaluated, which is worrying. The results obtained showed that many students report excessive daytime sleepiness and abuse of sleeping pills. The present study draws attention to the need to consider sleep quality as a tool to improve the understanding of psychological well-being and good quality of life among academic students.

Furthermore, the importance of investing in efforts to correct this trend is highlighted. Health promotion measures for the population of higher education students are necessary, especially for those with a heavy course load and a schedule that is sometimes difficult to follow, such as medical students. Therefore, there should be proposals to modify the health behaviors adopted, with the objective of improving, for example, sleep hygiene.

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