
SLEEP QUALITY ASSESSMENT IN COLLEGE STUDENTS FROM FORTALEZA-CE¹

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ABSTRACT: The aim in this research was to evaluate the sleep quality of college students in Fortaleza, Ceará, Brazil. A cross-sectional study was conducted with 701 students from the Universidade Federal do Ceará, from March to June 2011. We used the Pittsburgh Sleep Quality Index (PSQI). Most students presented poor subjective sleep quality (54%), sleep latency in less than 15 minutes (60.1%) and efficiency under 65% (99%). In the sample, the sleep duration was of 6.3 hours per day (SD±1.4 hours) (p<0.001). Data analysis revealed that a substantial portion of the college students (95.3%) surveyed presented poor sleep quality. It is essential to operationalize health promotion actions at the universities in such a way that the students construct their own quality of sleep.

DESCRIPTORS: Sleep. Sleep disorders. Students. Nursing.

AVALIAÇÃO DA QUALIDADE DO SONO DE ESTUDANTES UNIVERSITÁRIOS DE FORTALEZA-CE

RESUMO: O objetivo desta pesquisa foi avaliar a qualidade do sono de estudantes universitários de Fortaleza, Ceará, Brasil. Estudo transversal foi realizado com 701 alunos da Universidade Federal do Ceará, entre março e junho de 2011. Foi aplicado o Índice de Qualidade do Sono de Pittsburgh. A maioria dos universitários tinha uma qualidade subjetiva do sono ruim (54%), latência e eficiência do sono inferior a 15 minutos (60,1%) e a 65% (99%), respectivamente. A duração do sono da amostra foi de 6,3 horas diárias (DP±1,4 horas) (p<0,001). A análise dos dados evidenciou que parcela substancial dos universitários investigados (95,3%) possui má qualidade do sono. É determinante operacionalizar ações de promoção da saúde nas universidades para que o próprio acadêmico atue na construção da sua qualidade de sono.

DESCRIPTORIOS: Sono. Transtornos do sono. Estudantes. Enfermagem.

EVALUACIÓN DE LA CALIDAD DEL SUEÑO DE ESTUDIANTES UNIVERSITARIOS DE FORTALEZA-CE

RESUMEN: El objetivo de esta investigación fue evaluar la calidad del sueño de los estudiantes universitarios en Fortaleza, Ceará, Brasil. Se realizó una encuesta con los estudiantes de 701 en la Universidad Federal de Ceará entre marzo y junio de 2011. Se utilizó el índice de la Calidad del Sueño de Pittsburgh (PSQI). La mayoría de los estudiantes tenía una mala calidad subjetiva del sueño (54%), la latencia del sueño y la eficiencia de menos de 15 minutos (60,1%) y 65% (99%), respectivamente. La duración del sueño de la muestra fue de 6,3 horas por día (SD ± 1,4 horas) (p<0,001). El análisis de los siete componentes del PSQI mostró que una parte sustancial de los estudiantes universitarios encuestados (95,2%) tienen mala calidad del sueño. El análisis de datos reveló que una parte sustancial de la universidad investigado (95,3%) tenían mala calidad del sueño.

DESCRIPTORIOS: Sueño. Transtornos del sueño. Estudiantes. Enfermería.

INTRODUCTION

Bad quality of sleep knowingly has a direct effect on the quality of human life, as it seems to be involved in increased morbidity due to autonomous dysfunction, psychiatric disorders, car and automobile accidents, early aging, depression, kidney failure, glucose intolerance, hypercortisolemia; and decreased efficiency at work, etc.¹⁻⁷

Recent epidemiological studies have demonstrated that short sleep periods (less than seven hours) are strongly associated with general mortality, mainly due to cardiovascular diseases and type 2 Diabetes Mellitus.⁸⁻⁹ A meta-analysis found reduced chances of life among subjects who sleep a lot (more than nine hours) as well as among individuals who sleep little (less than seven hours), mainly due to cardiovascular illnesses and cancer, particularly among women.¹⁰

In accordance with the above manuscripts, problems with the duration and/or quality of sleep are closely related with non-transmissible chronic illnesses. Hence, bad quality of sleep is important component of vulnerability in human health. This derives from the fact that the architecture and physiology of sleep is an active and complex process that is necessary to establish the physical and cognitive health of human beings.

To give an example, college students normally display an irregular sleep pattern, characterized by changing start and end times, which tend to be later at weekends when compared to weekdays. In addition, during the week, sleep tends to be shorter than at weekends, as students go through sleep deprivation during class or workdays. These irregularities can negatively affect these young people's health.¹¹⁻¹² Usually, these young adults' attention, memory, problem-solving ability and academic performance are also affected. Given that it affects cognitive functioning, according to the consulted authors, sleep should be an important concern among college students, for whom academic performance is a priority.^{3-4,11-13}

The quality of sleep of college students is quite a widespread theme in global scientific literature. Some publications present the problem's state of the art in this population group across different continents. In Brazil, however, the studies found were accomplished with limited samples,

which makes it difficult to generalize their results to the entire population.^{1,12,14-18}

According to the authors consulted, research on the prevalence of bad quality of sleep among college students is relevant, mainly because it affects a significant group of students, independently of nationality (5-71%); increases the chances of different health problems, absenteeism, decreased productivity; and is closely related with physical and psychological conditions and even with death.¹³ Finally, college students represent the capital and future investment of a nation, making it fundamental for the development of a country that these are healthy people.⁴

Therefore, the aim in this research was to assess the sleep quality of college students in Fortaleza-CE, Brazil.

METHOD

A cross-sectional study was undertaken between February and June 2011 at *Universidade Federal do Ceará* (UFC), Fortaleza-CE, Brazil. The target population involved undergraduate students, male and female, properly enrolled in UFC programs offered on the campuses located in Fortaleza. The number of students is currently estimated at 17,228 students, distributed across six large knowledge areas, which are: Human Sciences, Exact Sciences, Agricultural Sciences, Health Sciences, Technological Sciences and Sciences.

A simple random sample was calculated without replacement, based on a formula for infinite populations. A percentage of 50% was adopted ($p=50\%$ and $q=50\%$), as this results in a maximum sample size when the significance level ($\alpha=0.05$) and a relative sampling error of 8% have been set (absolute error=4%). The sample size resulted in 600 subjects. After estimating a 10% rate of lost information in the questionnaires due to mistaken and/or incomplete answers, the final size totaled 660 subjects. At the end of the study, however, 701 college students had been investigated.

The sample was stratified in each of the main knowledge areas offered at UFC. Therefore, the share of each area in the total composition of students was calculated, showing: Human Sciences (21.5%), Exact Sciences (17.5%), Agricultural Sciences (14.5%), Health Sciences (14%), Technological Sciences (15.5%) and Sciences (17%).

From each knowledge area, a convenience sample of at least two undergraduate programs was chosen. Among these, students from different course semesters were investigated. The subjects were enrolled as follows: after voluntarily explaining the methods and study objectives in the classroom, each subject decided to participate in the research.

Data were collected between February and June 2011. First, meetings were held with the course coordinators and department heads to explain the research objectives and methods. Three baccalaureate nurses and three nursing students were responsible for collecting the data. They received a six-hour training to get familiar with the collection instrument and thus guarantee the reliability of the data.

The students answered a questionnaire about socio-demographic data and their quality of sleep. Sleep quality was analyzed based on the instrument called the Pittsburgh Sleep Quality Index (PSQI). The version adopted was previously translated, validated and adjusted to Brazilian cultural standards. The PSQI assesses the quality of sleep in the last month and consists of ten questions, which address seven components: subjective sleep quality; sleep latency; duration of sleep; sleep efficiency; sleep disturbance; need for meds to sleep; and day dysfunction due to sleepiness. The maximum instrument score is 21 points. Students scoring more than five points were classified as bad sleepers.¹⁹

The data were inserted in triple in an Excel database and then exported to the statistical software STATA version 8.0 for treatment and extraction of the results. The data treatment involved validating the internal consistency of the information typed and calculating central trend measures, based on a 95% confidence interval.

To check for differences between sleep quality proportions according to gender and age range, Pearson's Chi-square or Fisher's Exact Test (when necessary) was used. To analyze the association between the duration of sleep (in hours) and the sleep quality, the Mann-Whitney Test was adopted, according to the result of Kolmogorov-Smirnov's normality test.

This research is part of a wider project entitled - "The prevalence of the metabolic syndrome and its components in a college population from

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As a global ethical principle, the students who agreed to participate in the study signed an informed consent form. In addition, they were entitled to drop out of the study at any time and their anonymity was guaranteed. At the end of the data analysis, all subjects received the diagnostic impression of their sleep quality and of the other parameters evaluated on that occasion by e-mail.

RESULTS

The study population consisted of 701 college students, distributed across 24 undergraduate programs at UFC. In the group under analysis, the predominance of women (62.6%) was identified, with a mean age of 21.5 years ($SD\pm 4.5$ years) and an asymmetric distribution towards the right (Kolmogorov-Smirnov with $p<0.001$).

As regards skin color, 50.6% of the respondents were self-declared mulattos and 36.1% white; black and yellow represented the smallest proportions with 7.8% and 5.6%, respectively. Concerning the knowledge area, the percentages of participants in each of the six areas were equivalent. What the course semester is concerned, students taking the third (20.8%) and first semester (19.5%) were predominant; with lesser proportions (1.8%) of students in the tenth and twelfth periods.

The socioeconomic context indicates single college students (93%) who still live with their parents (71.2%) and for whom studying is their sole activity (65.2%). As observed, a significant part of the students' families belonged to economic classes C (39.6%) and B (39.7%) and lived on a mean monthly income of R\$ 3,206 *Reais* ($SD\pm 376$ *Reais*). In terms of minimum wages, the majority lived on a monthly family income of six or more (39.2%) and between one and three minimum wages (33.2%). It is important to highlight that 15% of the sample did not answer this question and that this variable showed an asymmetric distribution towards the right (Kolmogorov-Smirnov with $p<0.001$).

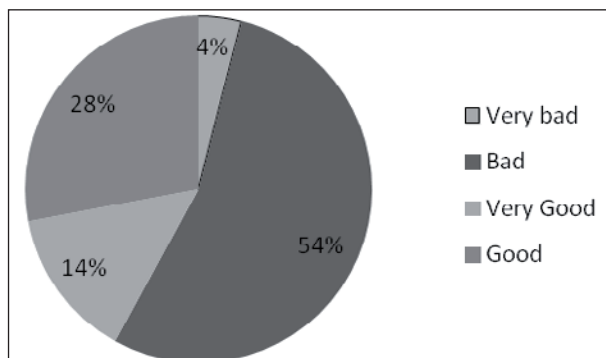


Figure 1 - Subjective sleep quality during the last month among college students. Fortaleza-CE, Brazil, 2011

In figure 1, it is observed that about half of the participants (54%) considered that their sleep quality in the last month was bad. Most of the interviewed students (60.1%) took 15 minutes or less to fall asleep in the last month. The majority (37.4%) emphasized this finding by affirming that they never took more than 30 minutes to fall asleep during the last month. On average, the interviewed college students take 19.7 minutes (SD±29.2 minutes) to sleep after they lie down. This variable reveals an asymmetric distribution (Kolmogorov-Smirnov with $p < 0.001$).

Table 1 - Sleep latency of college students. Fortaleza-CE, Brazil, 2011

Questions*	n	(%)	95% CI**
Time to fall asleep			
≤ 15 minutes	421	60.1	56.3-63.7
16-30 minutes	217	31.0	27.6-34.5
31-60 minutes	56	8.0	6.1-10.3
> 60 minutes	7	1.0	0.4-2.1
Impossibility to fall asleep within 30 minutes			
Never in the last month	262	37.4	33.8-41.1
Less than once/week	194	27.7	24.4-31.2
1 or 2 times/week	156	22.3	19.3-25.6
≥ 3 times/week	89	12.7	10.4-15.4

* Answers according to sleep during the last month; ** CI - Confidence Interval.

Concerning the duration of sleep, only 18.6% were able to reach more than seven hours in the last month. Most of the interviewees (62.7%) were located somewhat below, in the interval between six and seven hours (Figure 2). It is important to highlight that 52% of the students who sleep less than five hours per day are taking the first to fourth course semester. In general, the duration of sleep in the sample under analysis corresponded to 6.3 hours per day (SD±1.4 hours). This variable showed an asymmetric distribution (Kolmogorov-Smirnov with $p < 0.001$).

The mean sleep duration among those students who are considered good sleepers (6 hours and 44 minutes; SD±1 hour and 16 minutes) and bad sleepers (6 hours and 45 minutes; SD±1 hour and 42 minutes) was similar and revealed no statistically significant differences ($p=0.971$).

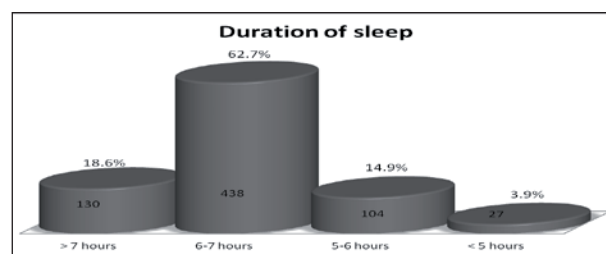


Figure 2 - Distribution of college students according to duration of daily sleep in the last month. Fortaleza-CE, Brazil, 2011

It should be highlighted that 99% of the research sample was classified in the worst range for the sleep efficiency component, that is, less than 65%. None of the 701 students under analysis was classified in the best sleep efficiency range, equivalent to 85%. Most interviewees (38.8%) go to sleep after midnight (between 00h00min

and 04h00min), followed by the group between 23h00min and 23h30min (36%); and before 22h00min (18.4%), every day. In the group with sleep efficiency scores below 65%, students in the first to fourth course semester (56.4%) and from the field of Human Sciences (20.4%) were predominant. On average, during the last month, the study participants went to sleep at 00h58min (SD±00h45min). This variable revealed an asymmetric distribution (Kolmogorov-Smirnov with $p<0.001$).

Almost half of the sample (44.6%) affirmed that they did not need to get up at night to use the bathroom and the majority indicated no respiratory problems while asleep, like uncomfortable breathing (71%) and heavy snoring (72%). It should be highlighted, however, that most participants sleep alone (64.8%). Nevertheless, among those who indicated sleeping with someone (21.4%), but in separate beds, the partner reported no heavy snoring (88.4%), long breathing

stops (94.6%), leg twitching/contracting (78.9%) or episodes of confusion (88.6%) while asleep during the last month.

The largest proportion (41.7%) affirmed they had no nightmares during the last month, but a significant part of the participants (36.7%) affirmed they had bad dreams at least once/week during the last month. A smaller part of the sample (19%) reported pain complaints, at least once per month, while asleep. Only 10.7% of the interviewees affirmed any other reason that hampered their sleep more than three times/week during the last month.

A substantial part of the research sample (91%) did not use any meds to help them sleep during the last month, neither prescribed nor on their own. More than half (53.8%) of the students who use meds to sleep without a medical prescription study in Human Sciences and was taking the first to fourth semester (46.2%) or the fifth to eighth semester (46.2%), respectively.

Table 2 - Daily sleepiness and sleep disturbance among college students. Fortaleza-CE, Brazil, 2011

Questions*	n	(%)	95% CI**
Difficulty to stay awake during habitual activities			
Never during last month	214	30.5	27.2-34.1
Less than once/week	191	27.2	24.0-30.7
1 or 2 times/week	202	28.8	25.5-32.4
≥ 3 times/week	94	13.4	11.0-16.2
Degree of difficulty to stay enthusiastic during habitual activities			
No difficulty	117	16.7	14.0-19.7
Very mild problem	310	44.2	40.5-48.0
Considerable problem	224	32.0	28.5-35.6
Severe problem	50	7.1	5.4-9.4

** CI - Confidence Interval; *Answers according to sleep during last month.

When distributing the study participants according to their difficulty to stay awake during the day to perform habitual activities, equivalent percentages were found for students who experience this problem at least once per week. On the other hand, the enthusiasm to perform their daily activities was also measured and indicated that most students have mild (44.2%) or considerable (32%) physical condition problems to perform these actions (Table 2). The daily activities were related to study, work, drive, leisure etc. Students

in Sciences (27.7%) and taking the first to fourth periods (54.3%) most frequently experienced difficulties to stay awake, at least once or twice per week, respectively.

At the end of this analysis of the seven PSQI components, it was evidenced that a substantial part of the college students under analysis (95.3%) had a bad quality of sleep (PSQI>5), according to information for the previous month. In general, the students' mean PSQI score was 9.4 points (SD ± 2.2 points), which indicates a bad quality of sleep.

As regards gender differences, the proportions of good and bad sleepers were higher among women (69.7% and 62.2%, respectively) than men (30.3% and 37.7%, respectively) ($p=0.390$). Bad sleepers belonged to the age groups between 16 and 20 (50.3%) and between 21 and 25 years (40.2%) ($p=0.551$). No statistically significant difference was found between good and bad sleepers when crossing the above data.

DISCUSSION

Many college students in this research indicated they considered their sleep was bad during the last month. In other studies with a similar scope, higher percentages of students who were dissatisfied with their sleep were found.^{13,20-21} One of the pillars of the human sleep pattern is exactly determined by the self-assessed satisfaction with sleep.²² Therefore, it is important for college students to efficiently self-perceive their sleep. In addition, earlier studies have highlighted that dissatisfaction with sleep can be a better indicator of a sleep disorder than insomnia itself.^{3,23}

Many students many find it difficult to acknowledge their own sleep problems though, like snoring for example, or to associate certain symptoms as a phenomenon of bad sleep quality, like in the case of lack of enthusiasm to accomplish daily activities.¹³ Therefore, besides the students' own efforts, families and other people who sufficiently share in the students' intimacy need to collaborate in the assessment of these subjects' sleep and in possible therapeutic indications.

In this research, the students showed no sleep latency problems. It is a fact, however, that technological developments, especially the Internet, negatively affect this aspect, as students tend to reserve their free time at night or rest hours to use services like e-mail, social, networks, movies, games, etc.

The general mean number of hours of sleep was 6.3 hours per day ($SD\pm 1.4$ hours). This duration remains below the general average of the Brazilian (7-9 hours) and global (6.5-8.5 hours) adult population, but was similar to the findings in other studies, involving Brazilian, North American, European, Asian and Middle Eastern college students.^{1,13-16,18,24-31} In other studies undertaken in Portugal and China, students slept more than seven hours per day.^{3,32}

As people can be classified into big and small sleepers, one cannot affirm for certain that the mean hours of sleep found in this study is insufficient to attend to the research subjects' physiological needs.

Practically the entire research sample shows low sleep efficiency and was ranked in the worst layer (<65%). All studies reviewed in Brazil and abroad show higher percentages on this item than the present research sample.^{13,15,33-34}

On the other hand, a significant part of the students revealed no high percentages of sleep disturbances. This may be related to some factors like age and the unconsciousness of sleep.

The sample consisted of young people. In this phase, most of our organic functions are preserved, so that the percentage of sleep-related problems can naturally be smaller. It has been established in the literature that age is negatively correlated with the slow-wave sleep (greater restoring ability). Moreover, as age advances, sleep latency increases while sleep efficiency decreases. Many pathological phenomena, such as snoring, obstructive apnea, gastro-esophageal reflux, teeth gnashing etc. can happen during one's sleep without being self-perceived. Therefore, it is important that relatives, friends and/or partners help to perceive these problems during rest periods.²⁴

A significant part of the young people under analysis indicated taking no meds to fall sleep, but those who did were taking a Human Science program. Studies in the United States and Argentina indicate that this behavior may be common among freshmen and medical students, as they reserve sleeping times to study and finish their academic activities.³⁵⁻³⁶

Thus, instead of using hypnotic meds, it is important for students to try and adapt their daily reality, in order to solve the lack of coordination in their circadian rhythm and, to the extent possible, to comply with their academic and professional obligations. To give an example, changing class times is impossible, but trying to sleep earlier the night before and fleeing from stimulating foods, substances or behaviors are options within these young people's reach.

In this research, it was verified that practically the entire sample consisted of bad sleepers. In comparison, all studies reviewed involving

Brazilian college students detected smaller percentages of bad sleep quality in their samples, that is: 24.6%, 34.6%, 60.3% and 14.9%.^{12,15,17-18} When considering foreign publications, the same fact was repeated: all manuscripts found showed lower percentages of bad sleep quality among college students, ranging between 9.8% and 89%.^{3,13,26,30,32,35-37}

Unfortunately, this discrepancy cannot simply be attributed to cultural differences among the student samples, as all studies used in the comparison adopted the same instrument, the PSQI. Moreover, the studies undertaken in Brazil also showed much lower results. As the selection of subjects was not done randomly, however, the volunteers who already know or mistrusted that they had sleeping problems were more interested in participating in the study, nevertheless, a significant part of the sample under evaluation shows a bad quality of sleep, and is consequently susceptible to different health problems related to sleep problems.

Nowadays, the bad sleep quality of college students is a global public health problem.³⁰ In recent decades, the inclusion of new technologies has transformed students' cultural habits and lifestyle around the world and has cooperated to cause sleep disturbances in these young adults.²⁹ Some of their behaviors play a determinant role in sleep hygiene: irregular programming of sleep times, long naps during the day, use of alcohol before sleeping and studying in bed.³⁰

It should be highlighted that the students are already familiar with much of the contents for good sleep hygiene. Therefore, an adjustment is needed between these young students' sleep hygiene habits and their chronotype and daily life.³⁸ Therefore, it is fundamental for Brazilian universities to create spaces to promote these students' health.³⁹

FINAL CONSIDERATIONS

A substantial part of the students displayed a bad quality of sleep. Putting in practice health promotion actions is fundamental for students themselves to contribute to the construction of their quality of sleep, that is, concern is needed with these subjects' empowerment. As citizens living in society, they are entitled to have access

to and assimilate specific health education actions in this respect. They need to be able to make decisions in health: to cooperate towards a restoring and healthy sleep, as an additional vehicle to promote their health.

This research presents some limitations, besides the lack of randomization. In the assessment of the students' sleep quality, a psychometric scale was adopted which, although equivalent, is less accurate when compared to other analytic methods, like polysomnography and actigraphy. In addition, the PSQI data were self-referred, that is, completion errors or a memory bias may have influenced the exactness of the data. The research did not control for college issues like test period, seminars, training periods etc. in data analysis. These items may have interfered in the students' answers. Thus, other studies on this theme should be developed in other Brazilian public and private universities, with a view to building a more consistent Brazilian panorama of the theme.

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