

## Sleep quality and body composition assessment in college students

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### Abstract

*The aim of this study was to identify the characteristics and pattern of sleep and to verify if there is a correlation between the poor quality of sleep and the body composition of university students. A descriptive cross-sectional study, with a quali-quantitative approach, attended by 100 university students, the subjects signed the consent term and began the fulfillment of the sociodemographic questionnaire and PSQI (Pittsburgh Sleep Quality Index). Individual anthropometric assessments were performed to analyze body*

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*composition of the individuals. Results show that 69% of individuals had poor sleep quality. Among them, 36% slept for 5 to 6 hours a night, 45% had sleep disorders, 42% used sleeping medication, 60.9% reported moderate to very daytime sleepiness. Studies state that sleep deprivation has been increasing, being the target of several studies that investigate the use of time to better understand the causes of this deprivation. The authors suggest that part of the time in bed is the result of the use of portable equipment and not necessarily of hours of sleep, which could explain the report of daytime sleepiness. In the present study, it was identified that poor quality and short sleep duration are associated with higher body fat (BF) values, as already identified in other studies. When faced with high scores of poor sleep quality present in the study population, it should be considered that such findings are not only related to irregular hours and high academic demands, but also to students' daily social and behavioral habits.*

**Keywords:** sleep, university students, physical activity, body fat.

## INTRODUCTION

Sleep, which is characterized as a basic human need whose preservation and maintenance are fundamental for the individual to lead a healthy life, has been studied in recent years. This is justified due to the correlation between habits, quality and sleep duration and several other factors. The lack of sleep may be considered a risk factor for increased morbidity mortality, as well as the increased prevalence of obesity and dyslipidemia (Bergamasco and Cruz, 2006; Marshall, Glozier and Grunstein, 2008).

The need of sleeping varies among individuals, and having poor quality and unsatisfactory sleep can trigger a series of behavioral changes such as mood variation, irritation, fatigue, mental slowness and low concentration (Rutenfranz, Knauth and Fisher, 1989). Insufficient sleep time can also negatively interfere in day-time activities, increasing the risk of accidents and low performance, both at work and in school activities (De Martino and Pizão, 2006).

It is currently known that both subjects who sleep a lot (more than nine hours) and those who sleep a little (less than seven hours) have increased risk of mortality, mainly owing to cardiovascular diseases, such as arterial hypertension, plus obesity, cancer and type 2 diabetes (Gallicchio and Kalesan, 2009; Cappuccio, 2011).

Obesity is a pandemic that affects all types of genders and ages, and is related to cultural, socioeconomic, genetic and other factors, with an expectation of reaching 20% of the world adult population in 2030 (Hruby and Frank, 2015; American College of Sports Medicine, 2009). There is evidence of the direct relationship between obesity and deprivation of sleeping (less than 5 hours) observed in studies involving 604,509 adults, in which it was found that for each additional hour of sleep, there was a reduction of 0.35 kg/m<sup>2</sup> in BMI (Beccuti and Pannain, 2011).

The relationship between the shorter sleep duration and the increased visceral and subcutaneous adiposity was verified by through studies using computed abdominal tomography. The survey revealed that people who slept 5 hours or less had a BMI increase of 1.8 kg / m<sup>2</sup>, a 13 cm<sup>2</sup> increase in visceral fat and 42 cm<sup>2</sup> of subcutaneous fat only in patients 40 years of age or younger (Hairston, 2010).

Several factors can change the routine and lifestyle, resulting in changes in sleep habits and affecting the individual's state of health. Admission to college with new activities, responsibilities and concerns can be considered an important risk factor for the development of health problems (Rodrigues, 2017). In addition, these changes can lead to an inadequate diet and low frequency of physical activity, which contribute to overweight and obesity (Paixão, Dias and Prado, 2010) .

Sleep irregularities also compromise the attention, memory, problem-solving capacity and academic performance of these students. Due to impaired cognitive functioning, sleep should be an important concern for university students, for whom academic performance is a priority (Araújo, 2013).

The aim of this study was to identify the characteristics and pattern of sleep and to verify if there is a correlation between the poor quality of sleep and the body composition of university students.

## **MATERIALS AND METHODS**

A descriptive cross-sectional study, with a quali-quantitative approach, attended by 100 university students in the Physical Education, Nursing, Physiotherapy and Biomedicine courses of the Einstein Integrated College of Limeira. The ethical issues related to research in humans were duly respected, and the project was approved by the Research Ethics Committee of the same school (protocol number 2882663).

After the presentation of the research and accepted for participation, the subjects signed the consent term and began the fulfillment of the sociodemographic questionnaire and PSQI (Pittsburgh Sleep Quality Index). Individual anthropometric assessments were performed to analyze body composition of the individuals, at scheduled dates and according to the volunteer's availability. Anthropometric measurements of shoulder, chest, waist, abdomen, hip, thighs, arms and calves were used, in addition to skin folds to determine the percentage of fat. The protocol used to measure the percentage of fat was the formula of 4 Pollock folds (triceps, subscapularis, suprailiac and abdominal).

The collected data was transferred to Microsoft Office spreadsheet Excel® and analyzed through the software Prism 7 version 7.0. To evaluate the normality of the data, the Shapiro-Wilk test was used, and for proportions and distribution, the chi-square. For the rejection of the null hypothesis, the confidence interval of 95% and 5% for significance was considered.

## **RESULTS**

A total of 100 students (62 men and 38 women) with a mean age of 21.5 years (SD + 4.6 years) participated in the study, 92 were single, 69 were working and 52 had regular physical activity. Regarding the Pittsburgh Sleep Quality Index (PSQI), the results of the components are presented in Table 1.

**Table 1. Absolute / relative frequency \* of the students' Pittsburg Sleep Quality Index (PSQI) components.**

Components	N / %	Component 4: Sleep efficiency	N/%
<b>Component 1: Subjective sleep quality</b>		> 85% / 75-85%	98
Very good / good	83	65% - 74% / < 65%	2
Very bad / Bad	17	<b>Component 5 : Sleep disturbances</b>	
<b>Component 2 : Sleep latency</b>		None / Less than once a week	67
≤ 15 min / 16 a 30 minutes	54	1 a 2 times a week / 3 times or more a week	33
31 a 60 minutes / > 60 minutes	46	<b>Component 6: Use of sleeping medication</b>	
<b>Component 3: Sleep duration</b>		None / Less than once a week	71
> 7 hours	45	1 a 2 times a week / 3 times or more a week	29
6-7 hours	19	<b>Component 7: Daytime sleepiness</b>	
5-6 hours	28	None / Little daytime sleepiness	52
< 5 hours	8	Moderate / A lot of daytime sleepiness	48

\*Because the number of subjects was 100, there was no need to present an exclusive column for %.

From the data presented in Table 1, it is observed that most students have a good sleep perception (83%), with latency time of up to 30 minutes (85%), 64% sleep from 6 to 7 hours or more. As for sleep efficiency, 98% is over 75%, sleep disturbances and medication use are reported in only 33% and 29% of subjects, respectively, and 52% report none or little daytime sleepiness.

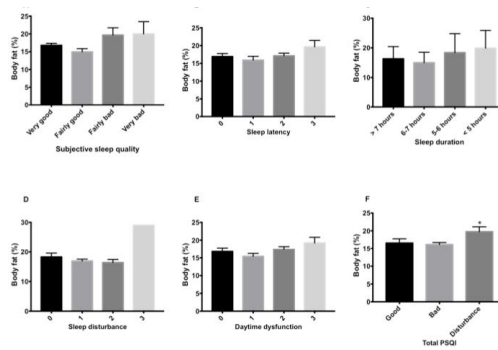
**Table 2. Pittsburg Sleep Quality Index (PSQI) components according to the two sleep quality groups (PSQI end result).**

Components of PSQI	Good sleep (n=31)		Bad sleep (n=69)	
	Absolute n	%	Absolute n	%
<b>Subjective sleep quality</b>				
Very good / Good	30	97%	53	77%
Very bad / Bad	1	3%	16	23%
<b>Sleep latency</b>				
≤ 15 min / 16 a 30 minutes	20	64,5%	34	49%
31 a 60 minutes / > 60 minutes	11	35,5%	35	51%
<b>Sleep duration</b>				
> 7 hours	24	77,4%	21	30,4%
6-7 hours	4	12,9%	15	21,7%

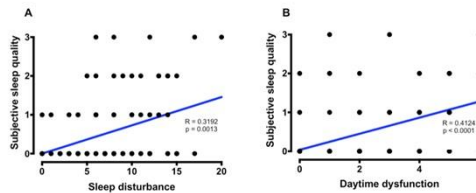
5-6 hours	3	9,6	25	36,2%
< 5 hours	0	0	8	11,7%
<b>Sleep efficiency</b>				
> 85% / 75-85%	28	90,3%	67	97,1%
65% - 74% / < 65%	3	9,7%	2	2,9%
<b>Sleep disturbances</b>				
None / Less than once a week	28	90,3%	38	55%
1 a 2 times a week / 3 times or more a week	3	9,7%	31	45%
<b>Use of sleeping medication</b>				
None / Less than once a week	31	100%	40	58%
1 a 2 times a week / 3 times or more a week	0	0%	29	42%
<b>Daytime sleepiness</b>				
None / Little daytime sleepiness	25	80,6%	27	39,1%
Moderate / A lot of daytime sleepiness	6	19,4%	42	60,9%

When the subjects were separated by the final PSQI result, according to Table 2, it can be observed that only 31% of the students were classified as Good Sleep and 69% as Bad Sleep. Among subjects with poor sleep, 77% had good / very good subjective sleep quality. Nevertheless, 51% had latency from 31 to 60 minutes / > 60 minutes, 36% slept from 5 to 6 hours a night, 45% have sleep disturbance, 42% use sleeping medication and 60.9% have moderate / a lot of sleepiness.

In addition to being asked about sleep, the practice of physical activity was investigated and physical evaluation was performed, as described in the methods. Of the 100 subjects, 52% practice physical activity, of these, 58% practice 4-7 times a week, and 71.1% have had this routine for over 13 months. Among the subjects who do not practice physical activity, 53.6% have Bad Sleep Quality, according to the PSQI result.



**Figure 1: Percentage of body fat x PSQI components.**



**Figure 2: Subjective sleep quality x sleep disturbance and daytime sleepiness.**

Regarding the physical evaluation, as can be observed in Figure 1, although no statistically significant difference was observed, it was possible to verify that the higher the percentage of body fat (CG), the worse the subjective quality of sleep, the longer the latency, greater daytime sleepiness and worse PSQI result. It was also observed a higher percentage of CG in individuals who sleep less than 5 hours per night when compared to the other study participants.

Figure 2 shows the correlations that had a statistically significant difference between Subjective Sleep Quality x Sleep Disorder ( $p = 0.0013$ ) and Subjective Sleep Quality x Daytime Sleepiness ( $p < 0.0001$ ).

## DISCUSSION

Most college students in this research had good perception and high sleep efficiency, although the PSQI result showed the opposite, with

69% of participants classified as having poor sleep. This divergence may perhaps be explained by the fact that many students have difficulty recognizing sleep problems in themselves or a poor quality of sleep, reflected as apathy, discouragement and irritability. In addition, this lack of identification of sleep quality may lead individuals to use sleep time to study, work, or practice a hobby (Araujo, 2013; Akhlagi and Glalebandi, 2009).

Regarding the number of hours of sleep (64%) reported sleeping 6 to 7 hours or more per night, which is similar to the average adult population of the city of São Paulo (20 to 29 years), which is 7, 7h on weekdays, from the general population (7-9h) and with the results found in other national surveys involving university students (Araujo, 2013; Tufic, 2008).

However, it was observed among subjects classified as poor sleep that 51% have latency of 31 to 60 minutes or more, 36% sleep between 5 and 6 hours a night, and 60.9% report moderate sleepiness to much daytime sleepiness, and that the worse the subjective quality of sleep, the higher the incidence of daytime sleepiness and sleepiness ( $p < 0.01$ ). A study by Lu Li et al (2018) shows that sleep disorders are common in Chinese college students, corroborating the data found in this research.

Lamote de Grignon Perez et al (2019) state that sleep deprivation has increased, being the target motifs of several studies that investigate the use of time to better understand the causes of this deprivation. The authors suggest that part of the time in bed is the result of the use of portable equipment and not necessarily of hours of sleep, which could explain the report of daytime sleepiness.

A study with intervention applied to volunteers who abstained for 15 days from using their cell phone near bedtime showed that the average sleep duration increased from 6.6h + 1.1h to 7.2h + 0.8h ( $p < 0.01$ ). It was also observed a decrease in daytime sleepiness ( $p < 0.01$ ) and an improvement in sleep quality, according to the PSQI, and at the beginning of the study 84% of the subjects had bad sleep and, after the intervention of the periods without use of sleep. only 59% maintained sleep classified as poor (Freitas et al, 2017).

In the present study, it was identified that poor quality and short sleep duration are associated with higher body fat (CG) values. This finding was also observed in other studies, such as performed by



Xiao et al (2016) and St-Onge (2014), in which subjects who slept 5 hours or less had higher values than all body measures of physical evaluation. In addition, they found that when compared to subjects who slept 8h and those who slept 6h, the increase in body measurements was almost 2 times greater.

## **CONCLUSION**

The data from this research corroborate with others in the literature, in which students have poor sleep quality and may be related to the presence of disturbances, excessive daytime sleepiness and higher body fat values.

When faced with high scores of poor sleep quality present in the study population, it should be considered that such findings are not only related to irregular hours and high academic demands, but also to students' daily social and behavioral habits.

Thus, it is suggested to professors the planning of classes and extracurricular activities, in order to allow students to participate and get involved with their professional education. Students better manage the time available for academic activities, including physical activity and finally, maintaining adequate sleep to rest and learning sedimentation.

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