

## FACTORS ASSOCIATED WITH DAYTIME SLEEPINESS IN MEDICAL STUDENTS

Fatores associados à sonolência diurna em estudantes de medicina

Fatores asociados a somnolencia diurna em estudantes de medicina

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### ABSTRACT

**Objective:** To analyze the factors associated with daytime sleepiness in undergraduate medical students in the north of Minas Gerais. **Method:** a cross-sectional study was performed, involving 231 students from the first, seventh and eleventh medical undergraduate periods. Daytime sleepiness was assessed by the Epworth Daytime Sleepiness Scale. Poisson regression analysis was performed to verify the factors associated with daytime sleepiness. **Results:** pathological and very pathological levels of daytime sleepiness were observed, respectively, in 34.6% and 6.9% of the students. The prevalence of daytime sleepiness was higher in students who suffered Common Mental Disorders, Emotional Exhaustion and Professional Ineffectiveness, and lower among those who lived with their parents. **Conclusion:** the prevalence of pathological daytime sleepiness among the students was high, and was related to common mental disorders, perception of emotional and professional exhaustion, and the context with whom the student lived with.

**Descriptors:** Sleep wake disorders, Disorders of excessive somnolence, Students, medical, Behavioral medicine, Life style.

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## RESUMO

**Objetivo:** Avaliar os fatores associados à sonolência diurna em graduandos do curso de medicina do Norte de Minas. **Método:** estudo transversal, realizado com 231 acadêmicos que estavam frequentando o primeiro, sétimo e décimo-primeiro períodos de graduação em medicina. A sonolência diurna foi avaliada pela Escala de Sonolência Diurna de Epworth. Realizou-se a análise de regressão de Poisson para verificar os fatores associados à sonolência diurna. **Resultados:** níveis patológicos e muito patológicos de sonolência diurna foram observados, respectivamente, em 34,6% e 6,9% dos estudantes. A prevalência de sonolência diurna foi maior nos estudantes com Transtornos Mentais Comuns, Exaustão Emocional e Ineficácia Profissional, e menor naqueles que residem com os pais. **Conclusão:** a prevalência de sonolência diurna patológica nos estudantes mostrou-se elevada, e teve relação com transtornos mentais comuns, percepção de exaustão emocional e profissional, além do contexto com quem o estudante residia.

**Descritores:** Distúrbios do sono, Distúrbios do sono por sonolência excessiva, Estudantes de medicina, Medicina do comportamento, Estilo de vida.

## RESUMEN

**Objetivo:** Evaluar los factores asociados con la somnolencia diurna en estudiantes universitarios de medicina del norte de Minas Gerais. **Método:** estudio transversal, realizado con 231 estudiantes que asistieron al primer, séptimo y undécimo período en medicina. La Escala de somnolencia diurna de Epworth evaluó la somnolencia diurna. Se realizó un análisis de regresión de Poisson para verificar los factores asociados con la somnolencia diurna. **Resultados:** se observaron niveles patológicos y muy patológicos de somnolencia diurna, respectivamente, en 34,6% y 6,9% de los estudiantes. La prevalencia de somnolencia diurna fue mayor en los estudiantes con trastornos mentales comunes, agotamiento emocional e ineficacia profesional, y menor en los estudiantes que viven con sus padres. **Conclusión:** la prevalencia de somnolencia patológica durante el día en los estudiantes fue alta y se relacionó con trastornos mentales comunes, percepción de agotamiento emocional y profesional y el contexto en el que residía el estudiante.

**Descriptorios:** Trastornos del sueño-vigilia, Trastornos de somnolencia excesiva, Estudiantes de medicina, Medicina de la conducta, Estilo de vida.

## INTRODUCTION

Sleep has an important relationship with the consolidation of memory, as it facilitates the abstraction of new rules, the integration of knowledge in existing schemes and the creativity that promotes learning. Sleep disorders, on the other hand, can impair the reorganization of memories and contribute to the emergence and/or worsening of mental disorders.<sup>1</sup>

Sleep disorders have become a public health problem, and medical students constitute themselves as a susceptible group for their development, due to the deprivation of hours of sleep that is still routinely practiced by many academics.<sup>2</sup> Restriction and fragmentation of the night period are the main causes of impaired sleep and, often, the result of exogenous factors such as family dynamics, work schedules, curriculum requirements, drug use, psychosocial stress, lifestyle, resulting in an inadequate quantity and quality of sleep.<sup>3-4</sup>

In addition to taking a full-time course, medical students carry out various extracurricular activities such as academic leagues, free-core courses, shifts, internships, monitoring and scientific initiation programs, submitting themselves to strong emotional pressure and stress due to high performance requirement. Consequently, they become a group with an irregular sleep-wake pattern and with a higher prevalence of sleep disorders.<sup>5</sup> Some institutions have adopted a curricular organization that ensures protected time for students ("green areas"), allowing moments for leisure and the rescue of personal and family life, as a strategy to relieve the overload of the course.

Despite the measures taken, pathological scores of daytime sleepiness can be identified in an expressive number of medical students,<sup>6</sup> and can influence professional burnout.<sup>7</sup>

To the north of the state of Minas Gerais, the city of Montes Claros congregates three medical schools (two private and one public), and has no studies on this public. This study aimed to evaluate the factors associated with daytime sleepiness in undergraduate medical students from the North of Minas Gerais.

## METHODS

This is a cross-sectional and analytical study, carried out with medical students from different moments (periods) of the course. The host city of the study has a population of approximately 400 thousand inhabitants and has three medical schools, one public and two private. There was no sample calculation, as the proposal was to approach students from the beginning (first period), the intermediate phase (seventh) and the end of the course (eleventh period). Academics who were not present at the institution on the dates of data collection (on at least three occasions, on different days and times) were excluded.

For data collection, the following instruments were used: questionnaire prepared by the authors themselves, with information on sex, age, income, marital status, course period, type of institution and whom they lived with; Epworth Daytime Sleepiness Scale;<sup>8</sup> General Health Questionnaire (QSG-12), to assess common mental disorders;<sup>9</sup> Beck Depression Inventory;<sup>10</sup> International Physical Activity Questionnaire (IPAQ - short form).<sup>11</sup> The Maslach Burnout Inventory - Student Survey (MBI-SS) in its validated version in Portuguese was also used.<sup>12</sup>

The academics were approached at the respective colleges where they study, at the beginning or end of classes. Those who were from the periods chosen for the research and accepted to participate in the study, signed the Informed Consent Form and later completed the self-administered questionnaire.

Calculations of absolute and relative frequency were performed to describe the population and estimate the

prevalence of daytime sleepiness. For the identification of associated factors, bivariate analysis was performed, whose outcome variable, daytime sleepiness, was dichotomized into normal and pathological. Sociodemographic variables, physical activity, depressive symptoms and common mental disorders were also transformed into dichotomous variables. Academics classified as active and very active, according to the IPAQ, were considered as adequate physical activity practitioners. Regarding depressive symptoms, students who presented any degree of depression (score greater than or equal to 10) were grouped in the same category. The presence of Common Mental Disorders was observed in those academics who had scores equal to or greater than four points in the QSG-12. The MBI-SS was assessed distinctly through the dimensions Emotional Exhaustion, Disbelief and Professional Effectiveness, whose presence was observed in students who had scores equal to or greater than four for the first two dimensions, and scores less than four for the last one.

The variables that were associated up to the level of 30% (p <0.30) using Pearson's chi-square test were evaluated together in Poisson regression analysis, with robust variance, assuming at the end the level of significance of 5% (p <0.05). For data analysis, the program IBM SPSS™ (Statistical Package For Social Sciences), version 19.0, was used.

The study was approved by the Research Ethics Committee (CEP) of one of the participating institutions under opinion 1,196,370 on August 24, 2015, Certificate of Presentation for Ethical Appreciation - CAAE: 47885615.3.0000.5146. All ethical precepts were respected for the conduct of the study, according to CNS Resolution No. 466, of 2012.

## RESULTS AND DISCUSSION

Questionnaires were collected from 231 medical students. Considering the total number of students in each period, the participation rate was 67.3%, 50.8% and 59.3%, respectively for the first, seventh and eleventh periods. Most of the respondent academics were female. The monthly family income has a median of R\$ 5,000.00 (P25 = 3,000.00; P75 = 10,000.00). Other sociodemographic characteristics of the students are shown in **Table 1**.

**Table 1.** Sociodemographic characteristics of medical scholars from the North of *Minas Gerais*, 2015.

Variables	n	%
<b>Sex</b>		
Male	91	39.4
Female	140	60.6
<b>Age Group</b>		
18 to 21 years old	100	43.3
Older than or equal to 22 years old	128	55.4
No reply	3	1.3
<b>Marital status</b>		
Single / Divorced	213	92.2
Married / Stable Union	18	7.8
<b>Type of Institution</b>		

Public	34	14.7
Private	197	85.3
<b>Course period in 2015</b>		
1st period	101	43.7
7th period	60	26.0
11th period	70	30.3
<b>Currently lives with</b>		
Alone	25	10.8
Parents	87	37.7
Relatives	50	22.0
Other students	53	22.9
In a boarding house	6	2.6

Regarding the prevalence of daytime sleepiness, 80 (34.6%) students had a pathological level, and 16 (6.9%) had a very pathological level. For students in the 1st period, the prevalence of pathological and very pathological levels of daytime sleepiness was 34.7% and 5.9%, respectively; for academics in the 7th period, it was 29.5% and 11.5%, and for academics in the 11th period, pathological and very pathological levels were observed in 34.7% and 4.3% of academics, respectively.

The results of the bivariate analysis are shown in **Table 2**.

**Table 2.** Factors associated with pathological daytime sleepiness in medical students (bivariate analysis), from the North of *Minas Gerais*, 2015.

Characteristics	Daytime sleepiness				p-value*
	Pathological		Normal		
	n	%	n	%	
<b>Sex</b>					
Male	31	34.1	60	65.9	0.062
Female	65	46.4	75	53.6	
<b>Age group</b>					
18 to 21 years old	39	39.0	61	61.0	0.627
≥ 22 years old	54	42.2	74	57.8	
<b>Institution</b>					
Public	14	41.2	20	58.8	0.961
Private	82	41.6	115	58.4	
<b>Marital status</b>					
With partner	9	50.0	9	50.0	0.449
Single	87	40.8	126	59.2	
<b>Course Period</b>					
1st period	41	40.6	60	59.4	0.793
Other periods	55	42.3	75	57.7	
<b>Lives with</b>					
Parents	29	33.3	58	66.7	0.049
Others	67	46.5	77	53.5	
<b>Common Mental Disorders</b>					
Absent	43	32.8	88	67.2	0.002
Present	52	53.1	46	46.9	
<b>Depressive symptoms</b>					
Absent	54	36.2	95	63.8	0.034
Present	41	50.6	40	49.4	
<b>Physical Activity</b>					
Adequate	42	37.2	71	62.8	0.185
Inadequate	54	45.8	64	54.2	
<b>Alcohol consumption</b>					
No	61	40.7	89	59.3	0.708
Yes	35	43.2	46	56.8	
<b>MBI-Emotional Exhaustion</b>					
No	46	34.1	89	65.9	0.007
Yes	48	52.2	44	47.8	
<b>MBI-Disbelief</b>					
No	79	39.9	119	60.1	0.227
Yes	15	51.7	14	48.3	
<b>MBI-Professional Effectiveness</b>					
Yes	68	38.0	111	62.0	0.043
No	26	54.2	22	45.8	

(\* ) Pearson Chi-square test.

MBI - Maslach Burnout Inventory

After joint analysis using Poisson regression, the variables that remained associated with pathological daytime sleepiness were Common Mental Disorders, Emotional Exhaustion and Professional Efficiency, and whom they lived with.

**Table 3.** Factors associated with pathological daytime somnolence in medical students (joint analysis), from the North of *Minas Gerais*, 2015.

Associated factors	Analysis adjusted	
	RP(IC)	p-value*
Lives with Others	1	
Parents	0.71 (0.51-0.98)	0.040
Common Mental Disorders		
Absent	1	
Present	1.40 (1.02-1.93)	0.039
MBI-Emotional Exhaustion		
No	1	
Yes	1.41 (1.03-1.93)	0.030
MBI-Professional Effectiveness		
Yes	1	
No	1.38 (1.01-1.88)	0.045

(\* ) Pearson Chi-square test.

MBI - Maslach Burnout Inventory

The presence of pathological scores of daytime sleepiness was observed in a high proportion of students. This result is congruent with the literature that records that medical students are considered a population particularly prone to problems related to sleep.<sup>13</sup> A high proportion of students with pathological levels of daytime sleepiness reflects the presence of inadequate sleep habits, which may be due to excessive activities, lack of concern with biological aspects that affect the learning process, or even a concern with non-academic demands, such as campus parties and other parties, since these behaviors are common in this population group, which experiences a phase of prolonged adolescence.

It is important to highlight that, although the observed levels are considered high, other national studies show even higher values. In a study conducted with 800 medical students from several Brazilian schools, public and private, it was observed that 48.1% had scores considered pathological and 10.3%, very pathological, for daytime sleepiness.<sup>14</sup> Although the study was conducted with a convenience sample, during an academic event, the results are very relevant. Another study, conducted with 218 students from a college in Minas Gerais, showed that 65.6% had signs of excessive daytime sleepiness and 37.1% considered sleep as bad or very bad.<sup>2</sup> In Goiás, daytime sleepiness was present in 51.5% of medical students at a federal university. In a meta-analysis carried out with Brazilian studies, the prevalence of excessive daytime sleepiness was 46.1%.<sup>15</sup>

International literature also points to expressive values of daytime sleepiness among medical students, with a prevalence of 39% among Saudi students<sup>13</sup> and 49.8% among Colombian students.<sup>16</sup> A study that evaluated sleep disorders using other instruments for collecting data also found alarming rates of change in more than a third of medical students.<sup>17</sup>

Although medical students are more vulnerable to problems related to sleep,<sup>18</sup> the young population, in general, has a great tendency to present such changes. A study conducted with 516 adolescents, aged between 10 and 19 years old, revealed that with aging, the tendency to decrease the hours of sleep is greater.<sup>19</sup> Another study

also carried out with adolescents observed an increase in excessive sleepiness with aging.<sup>20</sup> The excessive use of the internet, the burden of studying, the habit of sleeping late, among other aspects, are part of the lifestyle of many young people and can contribute to sleep disorders.<sup>21</sup>

In the case of medical students, in particular, several factors can be associated with both poor quality and excessive sleep during the day. Among them is the stress resulting from the overload of studies and the requirement for high academic performance.<sup>13</sup> The excess of extracurricular activities, among others, performed during the course, increases the risk of sleep disorders.<sup>3</sup> One fifth of medical students at a university from the United States reported sleeping much less than ideal for them, and the presence of excessive daytime sleepiness was significantly higher among those who had a sleep duration of less than 6 hours.<sup>22</sup>

Short-term sleep deprivation increases productivity in studies and attendance, however, in the long run, it causes a decrease in productivity and minor psychiatric disorders, causing damage to general health and the quality of life.<sup>14</sup> Literature is unanimous in highlighting that sleep disorders cause negative repercussions on quality of life,<sup>23</sup> interfere with daily academic performance,<sup>17</sup> and are associated with symptoms of psychiatric disorders.<sup>15</sup> Poor sleep quality can predict the severity of depressive symptoms in medical students.<sup>24</sup> It is worth mentioning that sleep disorders can also increase the risk of traffic accidents.<sup>25</sup>

In the present study, common mental disorders, emotional exhaustion, professional effectiveness, and people whom the academic lived with were associated with pathological daytime sleepiness.

Associations are pertinent, since common mental disorders and emotional exhaustion can also be associated with the requirements of the medical course, as well as students' being hard on themselves, causing negative effects on their quality of sleep, as well as on academic achievement. For some authors, stress is stimulated by sleep deprivation, since there is an increase in the release of cortisol by the body, which can also cause deficiency in the immune system and other pathologies.<sup>26-27</sup>

In the four national studies combined in meta-analysis, in addition to emotional exhaustion and decreased academic effectiveness, disbelief was also a factor associated with daytime sleepiness,<sup>15</sup> different from the present study. Stress, assessed by the Perceived Stress Scale, was associated with daytime sleepiness in a survey conducted with students in the fourth, fifth and sixth years of medical school in Saudi Arabia, and the chance of experiencing excessive daytime sleepiness was three times in those with average levels and high levels of stress compared to those with low levels.<sup>13</sup>

In the present study, the frequency of daytime sleepiness was higher among women, although the difference was not significant. Literature is controversial in relation to the sexes.

A study conducted with students in southern Brazil found no difference in scores of daytime sleepiness between the sexes,<sup>28</sup> as well as a meta-analysis carried out with Chinese university students.<sup>18</sup> In contrast, a study conducted with Chilean students from different areas observed that daytime sleepiness was higher among women.<sup>29</sup> Female adolescents were also more likely to experience daytime sleepiness and other sleep-related disorders than males in another study.<sup>30</sup>

There are few studies that have evaluated the factors specifically associated with daytime sleepiness. A survey conducted with medical students from Iraq, using the Sleep-50 questionnaire, found that feeling sad and depressed and not having an interest in daily activities were factors associated with sleep disorders,<sup>17</sup> ratifying the influence of psychiatric symptoms on sleep.

The present study presents some limitations. It was not possible to obtain data for all students in the selected periods. Besides that, there are other factors that have not been studied, such as: use of medicine and illicit drugs, use of the internet, all of which may also be associated with pathological daytime sleepiness. There are organic variables that can interfere with sleep, such as Obstructive Sleep Apnea Syndrome (OSAS) and obesity, which have also not been studied. However, the results presented are of great relevance and point to a situation of alertness for medical schools, considering that the poor quality of sleep of medical students can negatively interfere in the student's well-being and in their learning process.

## CONCLUSIONS

The prevalence of pathological daytime sleepiness in students was high. The presence of common mental disorders, perception of emotional and professional exhaustion, in addition to the context of whom they lived with, were shown to be factors associated with pathological daytime sleepiness for the studied group.

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