

Use of hypnotics, sleep quality and Burnout syndrome in medical students

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Objective: the aim of this study was to investigate possible associations between Burnout, use of hypnotics and sleep quality among medical students. **Method:** a cross-sectional quantitative study was conducted among medical students of a university center of northeastern Brazil, with the problem-based learning (PBL) methodology. The Maslach Burnout Inventory-Student Survey, the Pittsburgh Sleep Quality Index (PSQI) and a sociodemographic questionnaire were applied among pre-clerkship students of the course. **Results:** the study included 523 students and found 48 (9.2%) with tridimensional diagnosis criteria for Burnout syndrome (BS). Poor sleep quality and use of hypnotic drugs for sleep were associated with BS ($p < 0.001$ and $p = 0.003$, respectively). There were no statistical differences in age, gender, religion, marital status, student financing and performing paid work, between individuals with and without BS. **Conclusion:** there was an association between BS, use of hypnotics and poor sleep quality among pre-clerkship medical students.

Descriptors: Burnout Psychological; Education Medical Undergraduate; Education Medical; Sleep Aids Pharmaceutical; Sleep Initiation and Maintenance Disorders; Sleep.

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Uso de hipnóticos, qualidade do sono e síndrome de *Burnout* em estudantes de medicina

Objetivo: o objetivo deste estudo foi investigar possíveis associações entre *Burnout*, uso de hipnóticos e qualidade do sono em estudantes de medicina. **Método:** foi realizado um estudo transversal quantitativo com estudantes de medicina de um centro universitário do nordeste do Brasil, com metodologia de Aprendizagem Baseada em Problemas (ABP). O *Maslach Burnout Inventory-Student Survey*, o *Pittsburgh Sleep Quality Index* (PSQI) e um questionário sociodemográfico foram aplicados entre os alunos do pré-internato do curso. **Resultados:** o estudo incluiu 523 alunos e encontrou 48 (9,2%) com critérios de diagnóstico tridimensional para Síndrome de *Burnout* (SB). A má qualidade do sono e o uso de hipnóticos para dormir foram associados à SB ($p < 0,001$ e $p = 0,003$, respectivamente). Não houve diferenças estatísticas quanto à idade, sexo, religião, estado civil, financiamento escolar e realização de trabalho remunerado, entre indivíduos com e sem SB. **Conclusão:** houve associação entre SB, uso de hipnóticos e má qualidade do sono em estudantes de medicina pré-internato.

Descritores: Esgotamento Psicológico; Educação de Graduação em Medicina; Educação Médica; Medicamentos Indutores do Sono; Distúrbios do Início e da Manutenção do Sono; Sono.

Uso de hipnóticos, calidad del sueño y síndrome de *Burnout* en estudiantes de medicina

Objetivo: el objetivo de este estudio fue investigar las posibles asociaciones entre el síndrome de *Burnout*, el uso de hipnóticos y la calidad del sueño entre estudiantes de medicina. **Métodos:** se realizó un estudio cuantitativo transversal entre estudiantes de medicina de un centro universitario del noreste de Brasil, con metodología de aprendizaje basado en problemas (ABP). Se aplicó el *Maslach Burnout Inventory-Student Survey*, el *Pittsburgh Sleep Quality Index* (PSQI) y un cuestionario sociodemográfico entre los estudiantes de pre-administrativo del curso. **Resultados:** el estudio incluyó a 523 estudiantes y encontró 48 (9,2%) con criterios de diagnóstico tridimensional de síndrome de *Burnout* (SB). La mala calidad del sueño y el uso de fármacos hipnóticos para dormir se asociaron con SB ($p < 0,001$ y $p = 0,003$, respectivamente). No hubo diferencias estadísticas en edad, sexo, religión, estado civil, financiamiento de los estudiantes y realización de trabajo remunerado, entre individuos con y sin SB. **Conclusión:** hubo asociación entre SB, uso de hipnóticos y mala calidad del sueño entre los estudiantes de medicina antes de la rotación clínica.

Descriptores: Agotamiento Psicológico; Educación de Pregrado en Medicina; Educación Médica; Fármacos Inductores del Sueño; Trastornos del Inicio y del Mantenimiento del Sueño; Sueño.

Introduction

Burnout syndrome (BS) can be contextualized in an interrelated three-dimensional setting involving depersonalization, emotional exhaustion and diminished personal fulfillment. It is involved in a context that includes a personal conception of work overload associated with decreased productivity⁽¹⁾. The concept, created by Maslach and collaborators in the 1980s, has gained greater importance in the current decade⁽²⁻³⁾.

In the educational context, undergraduate medical students have shown exponential symptoms of psychic exhaustion in recent years⁽⁴⁾. About 24.8% of students have some BS symptom early in their course⁽⁵⁾. In Brazil, the prevalence among medical students has ranged from 10.3 to 55.1%⁽⁶⁻⁷⁾.

Curriculum overload, academic work deadlines, extracurricular activities, agitated work environments, sleep restraint, attention to family expectations, social life management and financial pressure are stressors often described by undergraduate medical students⁽⁸⁾. In addition, medical students are often exposed to an environment with significant psychic, physical and social stress⁽⁹⁾. These factors can affect academic performance, interpersonal relationships and sleep quality⁽¹⁰⁻¹¹⁾.

Poor sleep quality has been associated with increased risk for Burnout⁽¹²⁾, psychoactive substance use⁽¹³⁾, fatigue⁽¹⁴⁾, and psychological problems⁽¹⁵⁾.

In northeastern Brazil, the level of poverty is higher and the selection process for admission to medical school is strenuous. In addition, the poor government funding, full-time curriculum, competition for high academic performance and involvement in extracurricular activities result in increased susceptibility to psychological stress. These characteristics put these medical students at an excessive risk for sleep disorders and BS. In Brazil, there is a paucity of research on BS among the medical students^(6,16-17). Only two available, not in the northeastern of this country, analyses the association between BS and sleep quality⁽¹⁸⁻¹⁹⁾.

This study was developed to investigate possible associations between Burnout and sleep quality, using a representative sample of undergraduate medical students from a university center in northeastern Brazil. We hypothesized that there is an association between BS and poor sleep quality and a greater use of psychotropics among medical students.

Method

Study design and participants

A cross-sectional descriptive and quantitative study was conducted among undergraduate medical students at a university center of northeast do Brazil during

2019. The sample size was estimated using the Kish's formula⁽²⁰⁾ considering the prevalence of BS in previous studies^(6,16-17,21). A minimum sample size of 367.3 was calculated but was increased to 523 to increase the reliability of the study. Students who did not give consent were excluded from the study.

Participants were recruited at the university center, until the sample was complete, covering all semesters of the course, and proportional to the number of students in each semester. The medical course is divided into four years of pre-clinical and clinical content and two years of clerkship. The teaching methodology is hybrid with traditional lectures and active student-centered model called problem-based learning (PBL) or team-based learning (TBL). Practical activities involve simulation with actors as standardized patients designed to stimulate integrated reasoning and activities in clinical settings with real patients and assisted by preceptors.

The study was approved by the Research Ethics Committee of the institution (CAAE: 88272418.5.0000.5049) and all participants signed the Informed Consent Form.

Measurement

Sociodemographic questionnaire

Variables to assess sociodemographic status of the study participants were formulated by the authors. It includes questions on age, sex, year of study, religion, use of hypnotic drugs and others.

Maslach Burnout Inventory – Student Survey (MBI-SS)

To assess students' self-perception of Burnout, we used the MBI-SS (Maslach Burnout Inventory – Student Survey), which was adapted for Brazilian Portuguese⁽²²⁾. The MBI-SS consists of 15 questions subdivided into the following three subscales: emotional exhaustion (5 items), cynicism (4 items), and academic efficacy (6 items). All items were assessed by frequency using the following Likert scale (0-6): 0 (never), 1 (once a year or less), 2 (once a month or less), 3 (a few times a month), 4 (once a week), 5 (a few times a week), and 6 (every day). The cut-off points to identify the presence of BS were emotional exhaustion ≥ 27 , cynicism ≥ 10 and academic efficacy ≤ 33 . These scores corresponded to the 66th percentile of emotional exhaustion and cynicism and to the 33rd percentile of academic efficacy. Participants with high scores for emotional exhaustion and cynicism and low for academic efficacy were identified as having Burnout⁽⁶⁾.

Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index (PSQI) is a self-administered and brief instrument to assess the sleep quality and some factors that can influence it over a 1-month period. It consists of 19 self-rated questions and 5 questions rated by the bed partner or roommate,

which generate 7 component scores including sleep duration, sleep disturbance, habitual sleep efficiency, subjective sleep quality, use of sleep medication, daytime dysfunction, and sleep latency. Each component score ranges from 0 to 3 (0 score equals better and 3 is worst). A global score >5 designates poor sleep quality, whereas a 0-4 score is considered good-quality sleep. PSQI has good psychometric properties and has been validated among a student population in Brazil⁽²³⁾.

Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, Chicago, IL) version 20. The data were summarized using descriptive statistics such

as proportion, frequency, and mean. χ^2 and Pearson correlation analyses were used to explore associations and relationships between variables. A p-value ≤ 0.05 was considered statistically significant.

Results

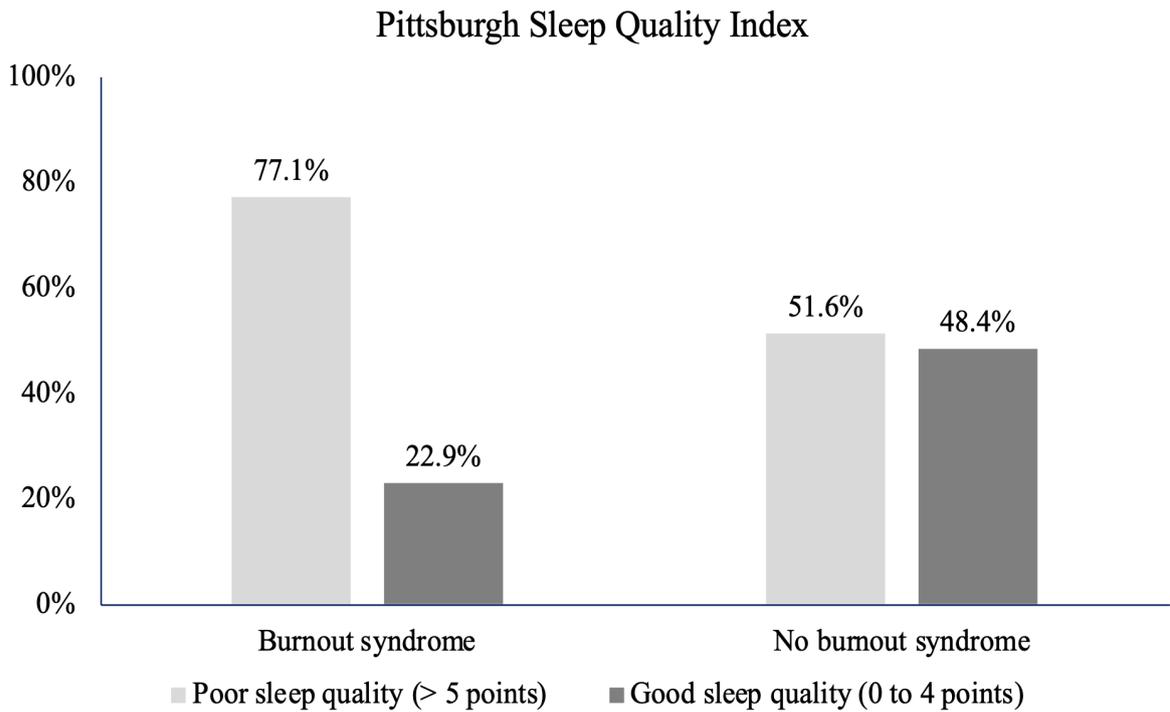
The study included 523 students, that represent 76.4% of the total of medical students from the university center. Among this sample, 48 (9.2%) of the students fit the tridimensional diagnosis criteria for BS. There were no statistical differences in age, sex, religion, marital status, student financing and performing paid work, between individual with and without BS (Table 1).

Table 1 - Demographic data from undergraduate medical students with and without Burnout syndrome (N=523). Fortaleza, CE, Brazil, 2019

Variables	Burnout syndrome		p-value
	Yes	No	
Age, median (P25-P75)	22 (20 - 23)	21 (20 - 23)	0.909*
Female, N(%)	33 (68.8)	299 (62.9)	0.426 [†]
Semester, N(%)			
1 st semester	4 (8.3)	68 (14.3)	0.753 [‡]
2 nd semester	4 (8.3)	64 (13.5)	
3 rd semester	6 (12.5)	64 (13.5)	
4 th semester	9 (18.8)	56 (11.8)	
5 th semester	8 (16.7)	59 (12.4)	
6 th semester	6 (12.5)	61 (12.8)	
7 th semester	5 (10.4)	43 (9.1)	
8 th semester	6 (12.5)	59 (12.4)	
Religion, N(%)			
Catholic	30 (62.5)	353 (74.3)	0.328 [†]
Evangelical	6 (12.5)	51 (10.7)	
I do not have	8 (16.7)	47 (9.9)	
Spiritism	3 (6.3)	13 (2.7)	
Other	1 (2.1)	11 (2.3)	
Marital status			
Single	46 (95.8)	426 (89.7)	0.673 [‡]
Married or stable union	2 (4.2)	43 (9.1)	
Divorced or separated	0	5 (1.1)	
Widower	0	1 (0.2)	
Student financing			
Yes	15 (31.3)	139 (29.3)	0.773 [†]
No	33 (68.8)	336 (70.7)	
Work paid			
Yes	5 (10.4)	33 (6.9)	0.378 [‡]
No	43 (89.6)	442 (93.1)	

*Mann-Whitney test; [†]Pearson's chi-square test; [‡]Fisher's exact test

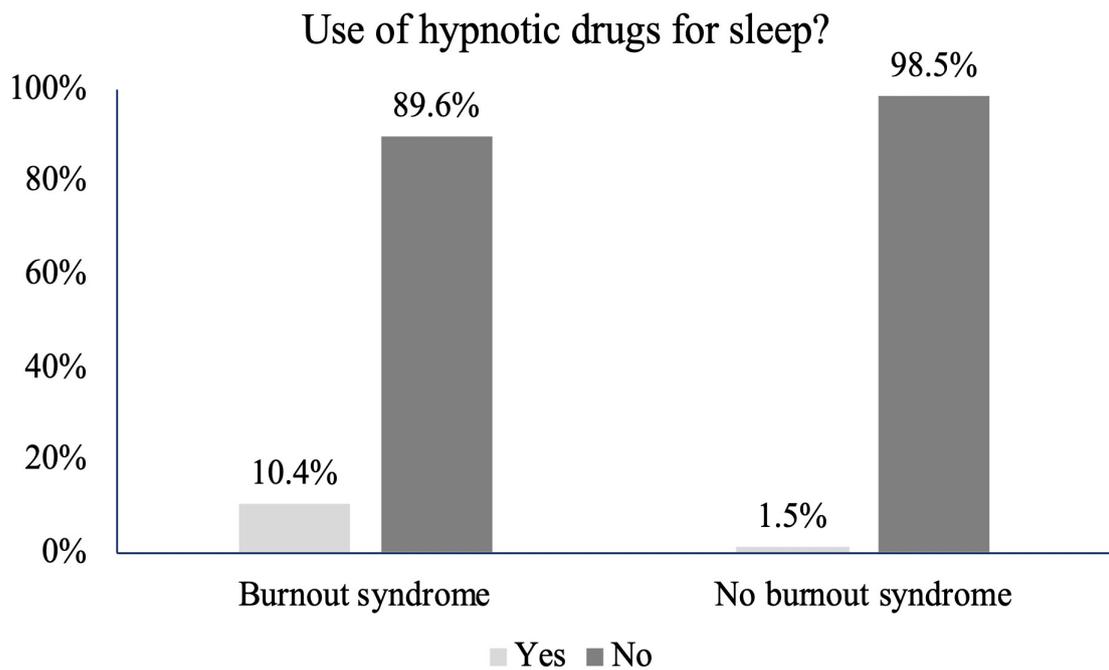
A higher prevalence of poor sleep quality was identified among undergraduate medical students with BS (Figure 1).



Pearson's chi-square test ($p < 0.001$)

Figure 1 - Association between sleep quality and Burnout syndrome in undergraduate medical students (N=523). Fortaleza, CE, Brazil, 2019

In addition, a higher percentage of students who regularly use hypnotic drugs for sleep was identified among those in the group who had Burnout syndrome (Figure 2).



Fisher's exact test ($p = 0.003$)

Figure 2 - Association between use of hypnotic drugs for sleep and Burnout syndrome in undergraduate medical students (N=523). Fortaleza, CE, Brazil, 2019

Discussion

The present study showed an association between the presence of BS and poor sleep quality among undergraduate medical students at a university in northeastern Brazil. In addition, a more frequent use of sleep hypnotic drugs was identified among students with BS. There are few studies conducted with undergraduate medical students investigating the association between BS and sleep quality⁽²⁴⁻²⁵⁾.

In a cross-sectional, quantitative and descriptive study of 184 medical students in Brazil, the prevalence of poor sleep quality was 61.9%. However, this study did not investigate the association between sleep quality and stress factors or BS⁽²⁶⁾. Another study with 320 medical students in a Saudi medical school, the prevalence was 30%. These authors identified an association between high levels of stress and poor quality of sleep⁽²⁷⁾.

In another cross-sectional study with 207 medical students from Iran using self-report questionnaires including MBI-SS and the Insomnia Severity Index identified a correlation between sleep complaints and Burnout symptoms⁽²⁸⁾.

In Nigeria, which as in northeastern Brazil has a high level of poverty and low government funding for education, the prevalence of poor sleep quality among medical students was 50.1%. The prevalence of psychological stress was 24.4%, which was associated with poor sleep quality. This study did not evaluate the presence of BS⁽¹⁵⁾.

A survey of students at the University of Pittsburgh School of Medicine, BS rates were 22.4% at the beginning of the year and 19.2% at the middle of the year. The authors found that pathological sleepiness and sleeping less than 7 hours a night were independent predictors of BS⁽²⁹⁾. In another research, a shorter night's sleep time was associated with symptoms of BS or depression in a cross-sectional descriptive study with 307 second year medical students in the USA⁽³⁰⁾.

In a study of 330 undergraduate medical students from Brazil, BS was associated with low frequency of family encounters ($p < 0.001$), lack of leisure time ($p = 0.005$) and low physical activity ($p = 0.03$). Meanwhile, the association between BS and sleep disorders has not been studied by these authors⁽⁷⁾.

A cross-sectional study with 419 students enrolled from the second to the eighth semester of the medical course at a public university in the State of Goiás, Brazil, found that 9.5% of medical students had BS according with the three dimensions of the instrument MBI-SS. It was observed that the longer the hours of sleep, the lower the symptoms of the exhaustion domain were ($B = -0.189$; $p < 0.001$)⁽³¹⁾.

In a review study about prevalence and factors associated with BS among university students, a total of 15 articles were identified, most of which were carried

out in Brazil. The general prevalence of BS ranged from 2.5 to 57.2%. Among the factors associated with this condition, a higher consumption of drugs to improve academic performance was identified⁽³²⁾.

A cross-sectional survey of 86 third-year medical students at Mount Sinai College of Medicine in New York, a traditional-style medical school, found a BS prevalence of 71%. Burnout students were significantly more likely to suffer from sleep deprivation ($p = 0.0359$)⁽³³⁾. A cohort study with 47 interns from the University of Pennsylvania identified only 4.3% of a high level of BS initially, compared with 55.3% at final year ($p < 0.0001$). In this study, no association between the development of chronic sleep deprivation and BS subscales was identified⁽³⁴⁾.

A prospective study with medical students of all years at the University of Pittsburgh School of Medicine found that the students with higher sleep quality experienced less academic Burnout⁽²⁹⁾. In another prospective study, thirty-four first-year medical students from a southern, urban medical school in the U.S. were evaluated using the variables of sleepiness (Stanford Sleepiness Scale) and Burnout (MBI-SS). Sleepiness from working 12 h shifts resulted in decreased empathy and increased Burnout⁽³⁵⁾.

An interventional study with 55 first- and second-year medical students submitted to two-week, sunrise alarm clock intervention in combination with electronic device removal at bedtime identified an improving sleep quality and reducing Burnout scores⁽³⁶⁾.

Unlike the BS prevalence rate found in the present study (9.2%), a prevalence of 35.2% was found in a study with 4,402 U.S. medical students⁽³⁷⁾. This divergence may be due to differences in the presence of stressors, sense of personal fulfillment and opportunities for professional performance. Another possibility for this divergence was the use of two single-item measures adapted from the full instrument to identify BS by the authors of this study.

In U.K. universities, 26.7% of medical students met the criteria to be considered "burned out", positively associated with year of study. The differences in BS reported and the prevalence in the present study may be due to low response rate and possible differences in course structure⁽⁵⁾.

The heterogeneity in the BS prevalence rate between the various studies is expected, and is due, in part, to the lack of consensus in the interpretation of the instruments for identifying this condition⁽³⁸⁾.

There are limitations to this study: non-inclusion of medical clerkship students, who are likely to suffer from greater mental and physical demands, and the cross-sectional design of the study, which does not allow to determine the cause-and-effect relationships between sleep quality and emotional exhaustion. In addition, the generalization of the findings should be cautious, as the

study was only conducted in a single University Center. Future studies may adjust these limitations.

Despite these limitations, this study was important because it showed a relevant association between sleep quality and Burnout syndrome. In addition, there is currently a dearth of research on this association.

There appears to be an association between intolerance of ambiguity, that is, the ability to tolerate the lack of reliable, credible or adequate information, and reduced psychological well-being in medical students and doctors. Workplace cultures and environments might be designed to reduce the likelihood that an individual's intolerance of ambiguity progresses to problems with their psychological well-being, like increasing the provision of supervision⁽³⁸⁻³⁹⁾.

This study identified an association between BS, use of hypnotics and poor sleep quality among medical students. Further studies are necessary to identify opportunities for interventions against BS and their impact on sleep quality among undergraduate students.

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