Sleep quality and associated factors in nursing undergraduates

Qualidade do sono e fatores associados em universitários de enfermagem

Calidad del sueño y factores relacionados en estudiantes universitarios de Enfermería

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Abstract

Objective: To verify the association between smoking, stress, sociodemographic and academic variables and sleep quality of nursing undergraduates.

Methods: Cross-sectional study with 286 undergraduates from a public higher education institution in the city of Salvador, state of Bahia. The Pittsburgh Sleep Quality Scale, the Perceived Stress Scale and tools on smoking, sociodemographic and academic variables were applied. Bivariate analysis was performed using Pearson's chi-square test or Fisher's exact test, and variables with p values <0.20 entered the multivariate analysis using the Poisson Robust Regression Model. Statistical significance of 5% was adopted. The modeling was performed with the backward procedure and the model was chosen using the Akaike information criterion.

Results: In the multiple analysis, undergraduates with a monthly family income of less than four minimum wages had a 20% increase in poor sleep quality when compared to those with a higher income than seven minimum wages (PR: 1.20; 95% CI 1.01; 1.43). Those with high level of perceived stress had an 11% increase in poor sleep quality compared with those with low level (PR: 1.11; 95% CI 1.02; 1.20). Smokers/former smokers also had an 11% increase in poor sleep quality compared to non-smokers (PR: 1.11; 95% CI 1.04; 1.18). The model was adjusted by course load and age.

Conclusion: Low income, high stress level and smoking were associated with poor sleep quality. The results challenge the proposition of interventions that can minimize the quality of bad sleep in nursing undergraduates.

Resumo

Objetivo: Verificar a associação entre tabagismo, estresse, variáveis sociodemográficas e acadêmicas e a qualidade do sono de universitários de enfermagem.

Métodos: Estudo transversal, com 286 universitários de uma instituição pública de ensino superior, em Salvador/BA. Aplicou-se a Escala de Qualidade do Sono de Pittsburgh, a Escala de Estresse Percebido e instrumentos sobre tabagismo, variáveis sociodemográficas e acadêmicas. Na análise bivariada utilizou-se o teste Qui-quadrado de Pearson ou Exato de Fisher e as variáveis com valor de $p \leq 0,20$ entraram na análise multivariada utilizando-se o Modelo de Regressão de Poisson Robusto. Adotou-se significância estatística de 5%. A modelagem foi realizada com o procedimento *backward* e para escolha do modelo utilizou-se o critério de informação de Akaike.

Resultados: Na análise múltipla, universitários com renda familiar mensal inferior a quatro salários mínimos tiveram aumento de 20% na qualidade de sono ruim quando comparados aqueles com renda maior a sete salários (RP: 1,20; IC 95% 1,01;1,43). Aqueles com alto nível de estresse percebido tiveram aumento de 11% na qualidade do sono ruim em comparação com aqueles com baixo nível (RP: 1,11; IC 95% 1,02;1,20).

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Fumantes/ex-fumantes também tiveram aumento de 11% na qualidade de sono ruim quando comparados aos não fumantes (RP:1,11; IC 95% 1,04;1,18). O modelo foi ajustado por carga horária no curso e idade.

Conclusão: A baixa renda, o nível alto de estresse e o tabagismo foram associados a qualidade do sono ruim. Os resultados desafiam a proposição de intervenções capazes de minimizar a qualidade do sono ruim em universitários de enfermagem.

Resumen

Objetivo: Verificar la relación entre tabaquismo, estrés y variables sociodemográficas y académicas y la calidad del sueño en estudiantes universitarios de Enfermería.

Métodos: Estudio transversal, con 286 estudiantes universitarios de una institución pública de educación superior en Salvador, estado de Bahia. Se aplicó el Índice de Calidad del Sueño de Pittsburgh, la Escala de Estrés Percibido e instrumentos sobre tabaquismo y variables sociodemográficas y académicas. En el análisis bivariado se utilizó la prueba χ^2 de Pearson o la prueba exacta de Fisher. Las variables con valor de $p \leq 0,20$ se incluyeron en el análisis multivariado, en el que se utilizó el Modelo de Regresión de Poisson Robusto. Se adoptó significación estadística de 5%. El modelo se realizó con el procedimiento *backward* y para elegir el modelo se utilizó el criterio de información de Akaike.

Resultados: En el análisis múltiple, estudiantes universitarios con ingresos familiares inferiores a cuatro salarios mínimos tuvieron un aumento del 20% en el sueño de mala calidad en comparación con aquellos con ingresos mayores a siete salarios (RP: 1,20; IC 95% 1,01;1,43). Aquellos con un alto nivel de estrés percibido tuvieron un aumento del 11% en el sueño de mala calidad en comparación con los de bajo nivel (RP: 1,11; IC 95% 1,02;1,20). Fumadores/exfumadores también tuvieron un aumento del 11% en el sueño de mala calidad en comparación con los no fumadores (RP:1,11; IC 95% 1,04;1,18). El modelo se ajustó por carga horaria de la carrera y edad.

Conclusión: Los ingresos bajos, el alto nivel de estrés y el tabaquismo se relacionaron con el sueño de mala calidad. Los resultados muestran un desafío para proponer intervenciones capaces de minimizar el sueño de mala calidad en estudiantes universitarios de Enfermería.

Introduction

Sleep quantity and/or quality are involved in the manifestation of various cognitive, psychological, immunological and metabolic changes and are influenced by social, clinical and cultural aspects.[1] Poor sleep quality is a marker of cardiovascular health, and the inflammatory mechanism is the most likely physiological response.[2,3]

Several studies have reinforced the consequences related to sleep impairment in undergraduate students, such as impaired academic performance[4,5] and excessive daytime sleepiness.[6,7]

Undergraduate students are social groups vulnerable to changes in sleep quality, as they interact with factors related to their deprivation upon entering the course.[8] Among them are the time devoted to academic activities,[6,9,10-12] working in opposite shifts,[10] anxiety, depression and stress,[7,9] excessive use of networks social networks, mobile phones and television[13,14] and alcohol consumption.[15]

In addition to full-time curriculum activities in pursuit of professional qualification, they complement training with extracurricular activities, participating in courses, academic leagues, internships, undergraduate programs, extension and monitoring, which requires more time to fulfill them.[6] Other factors that are also implicated in sleep quality relate to gender, age and marital status.[9,10]

Despite the existence of studies on the quality of sleep in nursing students showing that they are bad sleepers,[9,12,16] these were performed in a few Brazilian states, with restricted samples that included only the first two semesters[16] and freshmen and seniors.[12] Little is discussed about the quality of sleep in the academic environment and the associated factors, as well as the student support measures.[12]

Thus, it is relevant to know the quality of sleep and the main associated factors, providing information on aspects of vulnerability and protection of undergraduate students. This knowledge can guide actions and policies to promote health and quality of life during academic education and contribute to the advance in the theoretical field on the subject.

Given the above, the present study aimed to verify the association between smoking, stress, sociodemographic and academic variables and sleep quality in nursing students.

Methods

This is a cross-sectional research, matrix project clipping called "*Fatores de risco cardiovascular em graduandos (as) de enfermagem: implicações para o cuidado à saúde*". It was performed with nursing students from a public institution in Salvador, Bahia. In this institution, the curricular activities are developed

in the morning and afternoon shifts, focusing on the morning. The number of days and shifts of the student at school may vary according to the semester workload. The period of student's stay in school is also related to extracurricular activities and the number of study hours dedicated to the course, in addition to the semester workload.

The inclusion criteria defined for this research were: nursing undergraduates, enrolled in the first to tenth semester of the course, of both genders and with a minimum age of 18 years. The exclusion criterion was removal from the course by locking or exchanging.

Data collection was carried out from February 2016 to March 2017. During this period, 353 students were enrolled in the course with the following distribution in the semesters: 48 in the first, 39 in the second, 18 in the third, 32 in the fourth, 34 in the fifth, 34 in the sixth, 39 in the seventh, 29 in the eighth, 36 in the ninth and 44 in the tenth. Of the total number of undergraduate students, 286 agreed to participate, representing 81.0% of the study population.

The students were approached in the classroom, in the morning shift, at a time previously agreed with the professor and the collegiate of the course. It was where the researchers' presentation took place, the awareness about the importance of the research, the clarification of the objectives, the operationalization of data collection and the Free and Informed Consent Form (FICF). The tools were answered in the classroom after acquiescence to the research and signature of the consent form and the researchers waited in the classroom until the completion of the tools.

A sociodemographic characterization tool was used with closed and semi-structured questions about age, gender, self-declared race/color, marital status, monthly family income and consideration of sufficient monthly income. Another tool raised academic variables, such as semester in progress, semester workload, number of days and shifts you attend school, and/or course-related activities, and number of hours you spend for academic activities in addition to semester hours.[17] We also used questions related to smoking (current smoking, former smoker and non-smoker).

The Perceived Stress Scale (PSS) was adopted, built by Cohen et al.[18] and translated and validated by Luft et al.[19] in Brazil. Another Brazilian study performed the adaptation of the scale for Brazilian undergraduate students, and this version was used in this study. PSS 10 contains questions about feelings and thoughts in the past month, and the 10-item Likert scale was adopted with five response levels: 0 = never; 1 = almost never; 2 = sometimes; 3 = almost always; 4 = always). The perceived stress level is classified as low and high. Values above the 75th percentile (40 points) are considered indicative of high stress level.[20]

To assess sleep quality, the Pittsburgh Sleep Quality Index (PSQI) was translated, adapted and validated for the Brazilian Portuguese language,[21] which measures the subjective quality of sleep. It is valid and reliable[22] and contains 19 questions in seven domains: subjective sleep quality (individual perception of sleep quality, sleep latency (time needed to start sleep), sleep duration (time spent sleeping), habitual sleep efficiency (relationship between number of hours slept and hours spent in bed, not necessarily sleeping), sleep disturbances (presence of situations that compromise bedtime), use of sleeping medication, daytime sleepiness and disorders during the day (refers to changes in mood and enthusiasm for routine activities). The domain scores are summed to give an overall score ranging from 0 to 21. Sleep quality is classified as good (score 0-4) or poor (score ≥ 5). The higher the score, the worse the quality of sleep. Scores higher than five points classify the individual as a bad sleeper, as it indicates significant dysfunction in at least two domains or moderate dysfunction in at least three.

Data were analyzed using the Statistical Package of Social Science statistical software version 20.0. Categorical variables were analyzed in absolute and relative frequencies and continuous variables in mean and standard deviation. To verify the association between sleep quality and the variables of interest, Pearson's chi-square test or Fisher's exact test were used. The bivariate analysis also used the prevalence ratio with the respective 95% confidence interval (CI). Variables that obtained $p \leq 0.20$ entered the multivariate analysis using the Poisson Robust Regression Model. Adjustment variables were considered: age and workload attended in the semester. In the multivariate analysis, a statistical significance of 5% was adopted. The modeling was performed with the backward procedure. To choose the model

was used the Akaike Information Criterion (AIC) choosing the one with the lowest value.

The research was approved by the Research Ethics Committee, under Opinion 353,038. It was funded by CNPq (Brazilian National Council for Research and Technology Development - *Conselho Nacional de Desenvolvimento de Pesquisa e Tecnologia*) for the funding of the Research project, under Process 309092/2015-9. It complied with national and international standards of ethics in research with human beings.

Results

The mean age was 23.48 years (SD = 4.421), with a minimum of 18 and a maximum of 50. Female (90.2%), single with mates (90.9%) and self-reported blacks (87, 8%). Most had no paid activity (81.5%), had a monthly family income of less than four minimum wages (47.2%), considered their income unsatisfactory (65.0%) and lived with two or three people (55.6%).

Most attended between the 6th and 10th semester (54.5%), had semester workload between 401 to 500 hours (59.1%), attended school more than four days a week (87.1%) and two three shifts (80.8%) spent up to three hours a day to perform other activities besides the semester workload (58.0%). Low perceived stress predominated (74.5%) and non-smokers/former smokers (95.8%).

Most undergraduate students had poor sleep quality (86.4%). It was prevalent for women (87.9%), aged between 18 and 21 years (87.4%), self-declared black (86.9%), with monthly family income lower than four minimum wages (90.4%), who considered their income unsatisfactory (88.7%), separated/divorced and widowed (100.0%), who lived alone or with one person (88.3%) and did not work (87.1%). In the bivariate analysis, poor sleep quality was found for female undergraduate students (p=0.015), with a monthly income lower than four minimum wages (p=0.015) and who did not consider their income satisfactory for subsistence (p=0.115) (Table 1).

Table 1. Prevalence and Prevalence Ratio (PR) of poor sleep quality in nursing students according to sociodemographic characteristics

Sociodemographic characteristics	Total n (%)	Prevalence (%)	p value	PR	95% CI
Gender			0,015*		
Male	28 (9.8)	71.4			
Female	258 (90.2)	87.9		1.23	(0.96;1.56)
Age group			0.955**		
18 to years	87 (30.4)	87.4			
22 to 30	185 (64.7)	85.9		0.98	(0.89;1.08)
31 to 50 years	14 (4.9)	85.7		0.98	(0.78;1.23)
Race/Self-declared color			0.519*		
White	35 (12.2)	82.9			
Black	251 (87,8)	86,9		1,04	(0,89;1,22)
Monthly Family income (in MW)***			0,015*		
> 7	50 (17,5)	74,0			
4 to 7	101 (35,3)	87,1		1,17	(0,98;1,41)
< 4	135 (47,2)	90,4		1,22	(1,02;1,45)
Satisfaction with the monthly income			0.115*		
Yes	100 (35.0)	82.0			
No	186 (65.0)	88.7		1.08	(0.97;1.20)
Marital status			0.513**		
Separated/Divorced/Widowed/Single without a partner	2 (0.7)	100.0			
Single with a partner	260 (90.9)	86.9		0.86	(0.82;0.91)
Married/stable union	24 (8.4)	79.2		0.79	(0.64;0.97)
No. people you live with			0.500*		
None	60 (21.0)	88.3			
2 or 3	159 (55.6)	87.4		0.98	(0.88;1.10)
≥ 4	67 23.4)	82.1		0.92	(0.80;1.07)
Paid work			0.432*		
No	233 (81.5)	87.1			
Yes	53 (18.5)	83.0		0.95	(0.83;1.08)

p value obtained by Pearson's chi-square * or Fischer's exact **; *** Minimum wage (MW) at the time of the research 880 *reais* (*reais* is the Brazilian currency and is about 200 US Dollars). 1 (year 2016) and 937 *reais* (it is about 234 US dollars) (year 2017); PR- Prevalence Ratio; CI - Confidence Interval.

Table 2. Prevalence and Prevalence Ratio (PR) of poor sleep quality in nursing undergraduates according to academic variables, stress level and smoking

Variables	Total n (%)	Prevalence (%)	p value	PR	95% CI
Academic					
Semester in progress					
1st to 5th	130 (45.5)	85.4	0.660*		
6th to 10th	156 (54.5)	87.2		1.02	(0.93;1.12)
Workload this semester			0.296*		
136 to 400 hours	68 (23.8)	80.9			
401 to 500 hours	169 (59.1)	87.6		1.08	(0.95;1.23)
≥ 501 hours	49 (17.1)	89.8		1.11	(0.95;1.28)
No. of college days per week			0.981*		
1 to 3	37 (12.9)	86.5			
4 to 6	249 (87.1)	86.4		0.99	(0.87;1.14)
No. of turns attending course			0.274*		
1	55 (19.2)	81.8		1.06	(0.93;1.22)
2 to 3	231 (80.8)	87.5			
Time spent on activities beyond semester workload			0.128*		
Up to 3 h/day	166 (58.0)	83.7			
> 3 h/day	120 (42.0)	90.0		1.07	(0.98;1.17)
Perceived stress level			0.018**		
Low	213 (74.5)	83.6			
High	73 (25.5)	94.5		1.13	(1.04;1.22)
Smoking			0.160*		
No/quit	274 (95.8)	85.7			
Yes	12 (4.2)	100.00		1.16	(1.11;1.22)

p value obtained by Pearson's chi-square * or Fischer's exact **; PR - Prevalence Ratio; CI - Confidence Interval

Poor sleep quality was also predominantly found for undergraduate students between the 6th and 10th semester (87.2%), with a workload of 501 hours or more in the current semester (89.8%), who attended one to three days a week (86.5%) and in two or three shifts (87.5%) that spent more than three hours to perform course activities in addition to the shifts that attended school (90.0%), which were under high stress (94.5%) and were active smokers (100.0%). In the bivariate analysis, poor sleep quality was found for undergraduates who spent more than three hours on study activities in addition to the semester workload (p=0.128), had high stress level (0.018) and smoked or were former smokers (p=0.160). The prevalence ratio followed the same direction (Table 2).

In the multiple analysis, the variables that most contributed to poor sleep quality were monthly family income below four minimum wages, high perceived stress level, and smoking. Undergraduate students with a monthly family income of less than four minimum wages had a 20% increase in poor sleep quality when compared to those with a higher income than seven minimum wages (PR: 1.20; 95% CI 1.01; 1.43). Those with high level of perceived stress had an 11% increase in poor sleep quality compared with those with low level (PR: 1.11; 95% CI 1.02; 1.20). Smokers/former smokers also had an 11% increase in poor sleep quality compared to non-smokers (PR: 1.11; 95% CI 1.04; 1.18). The model was adjusted by course load and age (Table 3).

Table 3. Association between predictors of poor sleep quality in nursing students

Variables	PR	95% CI
Age		1.0
18 to 21 years		
22 to 30	1.00	(0.90;1.11)
31 to 50 years	1.04	(0.84;1.30)
Monthly Family income (MW)*		1.0
> 7		
4 to 7	1.15	(0.96;1.37)
< 4	1.20	(1.01;1.43)
Workload this semestre		1.0
136 to 400 hours		
401 to 500 hours	1.08	(0.95;1.23)
≥ 501 hours	1.10	(0.94;1.27)
Perceived stress level		1.0
Low		
High	1.11	(1.02;1.20)
Smoking		1.0
No/quit		
Yes	1.11	(1.04;1.18)
AIC = 582.18		

Logistic Regression Model adjusted for age and course load; PR - Prevalence Ratio; CI - Confidence Interval. * Minimum wage (MW) at time of research 880 *reais* (*reais* is the Brazilian currency and is about 200 US Dollars). 1 (year 2016) and 937 *reais* (it is about 234 US dollars) (year 2017)

Discussion

Sleep disorders have been increasingly associated with increased morbidity and mortality. Improving sleep quality decreases the incidence of depressive disorders, psychoses, and cardiovascular, metabolic, and inflammatory diseases.[23] The health risks related to poor sleep quality make the high prevalence of nursing students worrying. This finding corroborates other research with undergraduate nursing students,[9,12,16] from other health professions,[4-7,10,13,14,16,24-26] and other areas of academic education.[11,15]

Relevant data from this study showed that the high level of perceived stress was associated with poor sleep quality, corroborating other investigations with undergraduate students.[9,26,27] A hypothesis for this relationship is that individuals with stress symptoms have elevated serum cortisol levels, which keep them active and alert. Changes in cortisol secretion may be related to typical complaints associated with sleep problems.[14]

Excessive academic responsibilities, high amount of curriculum components and workload. involvement with extracurricular activities; difficulties regarding the contents seized; reconciling academic demands with family and social life; concerns with assessments and knowledge acquisition; uncertainty of insertion in the labor market; commuting to the college campus; interpersonal conflicts with parents, professors and class stand out as potential stressors for undergraduate students.[9] In this investigation, the students who spent more than three hours in activities, in addition to the shifts that attended the course, had poor sleep quality. Often, due to academic demands, they use part of their sleep period to meet them and, as a result, sleep later and wake up earlier, having less sleep time at night, usually shorter than needed for organic restoration.[9]

It was noteworthy that undergraduate students between the sixth and tenth semester of the course had a higher prevalence of poor sleep quality than those who attended the first to fifth semester, although the training phase was not a variable with statistical significance in the multivariate analysis. This finding may reflect the training phase that puts them most exposed to the variability of shifts in hospital institutions, as occurs with undergraduate students who work in practical activities in shift rotation, including night shift. Moreover, at this stage of training, more inserted in clinical practice, may be more exposed to stressors, such as difficulties and conflicts in communication between the multidisciplinary team, the need to develop procedures with patients and the experience of feelings of suffering that arise from involvement with care. These considerations, among other aspects, require further research to better understand the relationship of the training phase with changes in sleep quality.

It was also evidenced that undergraduate students with a monthly family income of less than four minimum wages and who did not consider their income satisfactory for subsistence presented poor sleep quality. Overall, there is a relationship between sleep and socioeconomic status. Low socioeconomic status can be a stressor and a sleep quality reducing agent.[11] Research has shown that lower income individuals are exposed to factors that negatively influence sleep, such as worries and homes located in noisy areas.[28] A systematic literature review of adolescents from different socioeconomic strata found a significant relationship between socioeconomic indicators and sleep quality. It was observed that the low socioeconomic condition reflected the worse subjective perception of sleep quality, shorter sleep duration and greater daytime sleepiness.[29] However, this association is still little explored, and other studies involving undergraduate students are not found in the literature.

In this study, the undergraduate students had worse sleep quality. Women usually have sleep disorders related to the influence of physiological and cyclic hormonal variations.[22] This can also lead to increased susceptibility to external factors such as stress.[30] Although research shows that women have altered sleep,[31,32] including studies with undergraduate students,[29] the structural and biological mechanisms that would explain this fact are not yet fully understood.

Smoking was also associated with poor sleep quality. Nicotine is known to increase serum levels of dopamine, a neurotransmitter that acts as a stimulant in the body, increasing alertness and influencing the

onset of sleep disorders such as insomnia and daytime sleepiness.[33] Other investigations with undergraduate students also identified an association between poor sleep quality and smoking.[24,27]

In the multivariate analysis, monthly family income less than four minimum wages. High perceived stress level and smoking were the variables that most contributed to poor sleep quality, showing multiple factors related to impaired sleep quantity and/or quality.[34] These findings show that sleep, besides being regulated by physiological mechanisms,[35] is influenced by external factors, which affected the studied group.

Considering the group of variables associated with poor sleep quality, it appears that educational and psycho-pedagogical support programs, together with undergraduate students, can contribute to becoming aware of the damage to health resulting from poor sleep quality; for valuing the preservation of sleep quality; better time management for academic activities; better coping with stressors and conflicts during academic education; and for the control of active and passive smoking. It is also essential to reflect the results of this study with professors and educational managers, so that they can analyze the impact of activities and academic responsibilities on the quality of sleep of undergraduate students, and guide the integrated planning of curriculum components. possibility of achieving a balance between the goals and the intended demands of the training.

The research limitations include accessibility sampling and cross-sectional study, which does not allow inferring causality, since exposure and outcome are collected simultaneously. Longitudinal studies are recommended to monitor the sleep quality of undergraduates during the different phases of academic education.

Conclusion

Undergraduate students with poor sleep quality prevailed. In the multiple analysis, adjusted for age and workload, psychosocial and behavioral variables contributed to poor sleep quality, such as low monthly family income, high level of perceived stress, and smoking. The results challenge the proposition of interventions that can minimize the quality of bad sleep in nursing students.

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Collaborations

Santos AF, Mussi FC, Pires CGS, Santos CAST and Paim MAS contributed to the project conception, literature review, data analysis and interpretation, article writing, relevant critical review of the article's intellectual content, adequacy to the journal norms and approval of final version to be published.

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