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Research article

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The authors report that partial results of the study were presented in an oral communication and in a summary published in the annals of the 12th Brazilian Congress of Collective Health, held in 2018 in Rio de Janeiro, RJ, Brazil.

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Sleep quality and associated factors among professors

Qualidade do sono e fatores associados entre docentes de educação superior

Abstract

Introduction: poor sleep quality can compromise both health and quality of life. *Objective*: to estimate the prevalence and associated factors of poor sleep quality among professors of a public university in the state of Bahia, Brazil. *Methods*: exploratory, cross-sectional study, conducted from November 2015 to April 2016 with 423 professors randomly selected. Sleep quality was measured using the Mini-Sleep Questionnaire (MSQ) scale. *Results*: the poor sleep quality prevalence was 61.3%. The most frequent complaints were difficulty in falling asleep, waking up tired, waking up with a headache and not having time to sleep during the day. The following factors were statistically associated with poor sleep quality: maintaining more than one job, irregular and/or insufficient time to leisure activities, six or fewer sleep hours, complaints of musculoskeletal pain and headache, and high psychological demands with low control over work. *Conclusion*: the working conditions and the associated factors that provide high prevalence of poor sleep quality among professors should be rethought in favor of the workers' health and the importance of these work for society.

Keywords: occupational health; sleep; professors; higher education; cross-sectional studies.

Resumo

Introdução*: a baixa qualidade do sono pode comprometer tanto a saúde como a qualidade de vida.* Objetivo*: estimar a prevalência e os fatores associados à qualidade do sono ruim entre docentes de educação superior de uma universidade pública na Bahia.* Métodos*: estudo exploratório, transversal, realizado de novembro de 2015 a abril de 2016 com 423 docentes aleatoriamente selecionados. A qualidade do sono foi mensurada pela escala Mini-Sleep Questionnaire (MSQ).* Resultados*: a prevalência de qualidade do sono ruim foi de 61,3%. As queixas mais frequentes foram: dificuldade de adormecer, acordar cansado, acordar com dor de cabeça e não ter tempo para dormir durante o dia. Apresentaram-se estatisticamente associadas com a qualidade do sono ruim: manter mais de um vínculo empregatício, tempo irregular e/ou insuficiente para a prática de atividades de lazer, seis horas ou menos de sono, queixas de dor musculoesquelética e de cabeça, e alta exigência psicológica com baixo controle sobre o trabalho.* Conclusão*: condições de trabalho que propiciam os fatores associados à elevada prevalência de qualidade do sono ruim entre docentes devem ser repensadas em prol da saúde desses trabalhadores e da importância do seu trabalho para a sociedade.*

Palavras-chave: *saúde do trabalhador; sono; docentes; educação superior; estudos transversais.*

Introduction

Sleep is a necessary physiological process for human survival and, when in good quality, it helps to maintain a good wakefulness[1]. Sleep quality, when impaired, causes responses in the body that can alter cognitive, behavioral, psychomotor functioning, in addition to impairing the mood, increasing levels of stress, tiredness, discouragement and complaints of pain and other problems that compromise health and quality of life[1].

Among the factors and work situations that contribute to changes in sleep quality, psychosocial variables, sociodemographic characteristics and negative experiences at work are also mentioned, which aggravate stressful responses, increase release of glucocorticoids (GCs) – a hormone that regulates the defense reactions activated by stress – and hinder workers' recovery and rest period before and after working hours[2-5]. In higher education, the multiple academic demands are made up of long hours, excessive activities and pressure to increase productivity, performance and competitiveness, among other conditions, trigger changes in the health situation and, consequently, in the professors' quality and quantity of sleep[2,6].

Demands increase, requirements and responsibilities drive professors to the need of creating new social, emotional and pedagogical skills that impact on different dimensions of life[7]; it is possible to state that sleep is one of those affected dimensions[2,8]. It is important to know the dynamics involved in the professors' work and their relations with biological needs, such as sleep, since these workers are inserted in activities that demand cognition, logical and fast reasoning, memory and critical reflection.

In the current scenario, the sleep quality in professors has been altered due to the demands and arrangements in the time spent in work activities. In this context, the growing need to expand their working time, inside and outside the academic environment, becomes a reality, requiring from the professors a continuous greater dedication. The use of time, which has been increasingly directed to work demands and by the effort to meet academic requirements,[9] is a condition that reduces the time available for personal activities, such as leisure, rest, social and family interactions.

Sleep alterations, in addition to causing serious consequences for health, result in high financial costs for society and for the educational institutions, considering that the aggravation of this condition can lead to the withdrawing of professors from their work functions.

Given the above, it can be said that the low sleep quality is highly harmful to the individual, whether in the context of work, health or even interpersonal relationships. Impaired sleep, without favoring rest, causes consequences that are often imperceptible, but highly threatening to physical, emotional, relational and productive integrity, becoming, in general, a public health problem[1,2,5] that deserves further investigation and publication, above all due to its effects on the professors'health.

Although the negative effects of sleep quality interfere with work performance, this topic receives little attention in the epidemiological literature considering the context of the professors' work. This study aimed at estimating the prevalence and associated factors of poor sleep quality among professors of a public university in the state of Bahia, Brazil.

Methods

This is an epidemiological cross-sectional exploratory study. It is an excerpt from the research entitled "Occupational stress and common mental disorders among professors", developed by Epidemiology Research Group of the Universidade Estadual de Feira de Santana, Bahia, Brazil, from November 2015 to April 2016.

All professors who were effectively teaching were eligible for the study, regardless of the type of employment contract they had with the university. The study did not include those who were away from work either for professional development or due to illness, vacation, personal leave or maternity leave. All those who refused to participate in the research were excluded.

The selection of professors was made by stratified sampling according to the allocation by type of employment contract and department. A random selection was carried out using the Open Epi software, version 3.03a, with a numerical procedure to identify the participants.

To calculate the sample size, the total number of professors from the university (931) was considered, with a sampling error of 5%, a confidence level of 95%, and an expected poor sleep quality prevalence of 46.7%[2], obtaining the minimum sample size of

271 professors. We added 20% due to possible losses, totaling 324 professors. At the end of the data collection, 423 professors had participated in the research. Although the original study was not designed specifically to assess the professors' sleep, the sample here studied has power to investigate this study.

For data collection, a standardized, anonymous and self-administered questionnaire was used, consisting of nine blocks. Aiming at reducing the information bias, all researchers were previously trained in order to guarantee the standardization of data collection. The interviews with the professors were made on the days when the department and collegiate bodies meetings took place. When professors were not found at the meetings, we looked for them in the classrooms. To avoid losses in the study, we made up to four attempts to find each professor.

Sleep quality was assessed using the Mini-Sleep Questionnaire (MSQ) scale[10], an instrument that evaluates sleep quality. The MSQ consists of 10 questions with answers on a Likert scale ranging from 1 (never) to 7 (always). The highest scores characterize poor sleep quality. The total sum of the scores is divided into four levels: 10 to 24 points indicate good sleep; 25 to 27 points, slightly altered sleep; 28 to 30 points, moderately altered sleep; and $\geq$ 31, very altered sleep[10,11].

In this study, we analyzed the MSQ results as a dichotomous variable: the sleep quality defined as good was characterized by the sum of the responses that reached 10 to 27 points, and the sleep quality defined as poor, by the sum that reached 28 to 70 points.

For the data analysis, a descriptive evaluation was initially carried out, based on the work experiences of the demand-control model (DCM)[12]. We analyze the socioeconomic characteristics, complaints of sleep quality, work, life habits, complaints of pain and psychosocial aspects at work.

The prevalence of sleep quality was assessed according to these variables of interest. The initial exploration of the crude associations was made by bivariate analysis. Prevalence, prevalence ratio, and their respective 95% confidence intervals were estimated.

The multiple logistic regression analysis (MLRA) was calculated according to the following steps: 1) selection of variables based on the objectives of the study and the criteria identified in the literature review; 2) verification of the model's assumptions; 3) pre-selection of variables for inclusion in the analysis using the likelihood-ratio test, with the adoption of a 25% significance level; and 4) use of the backward procedure in the MLRA to select the best model. In this stage, the significance adopted was 5%[13].

We used Poisson regression analysis with robust variance to obtain prevalence ratio estimates. We checked the adjustment quality of the final model using the Hosmer-Lemeshow test[13] and the area on the receiver operating characteristic curve (ROC). We conducted data analysis and processing using the statistical programs Statistical Package for the Social Sciences (SPSS), version 23.0 and Statistics Data Analysis (Stata), version 17.

The study followed the National Health Council 466/2012 resolution and was submitted and approved by the Research Ethics Committee (CEP) under the report number 1.145.223 and CAAE 44623115.8.0000.0053. Before receiving the questionnaires, all participants read and signed the Free and Clarified Consent Term (FCCT), accepting to participate in the research. The professors' participation took place on a voluntary basis, with confidentiality at all stages and in the information obtained.

Results

Table 1 presents the descriptive analysis of the professors' sociodemographic characteristics. In the population women predominated (52.0%), young adults aged between 25 and 46 years old (51.1%), with a partner (70.6%), with children (70.3%) and with a monthly income of more than 10 Brazilian national minimum wages (65.3%). Considering the professor distribution by department, the Department of Health was the one with the highest percentage (28.7%), followed by the departments of Arts and Literature (12.3%) and Biological Sciences 12.1%.

Of the 423 professors participating in this study, 408 valid and self-reported answers on sleep quality were analyzed; therefore, there was a loss of 3.5%. Of these, 250 reached scores greater than 28 on the Mini-Sleep Questionnaire (MSQ)[10,11], indicating a poor sleep quality prevalence of 61.3% (**Table 2**).

Table 1 Sociodemographic characteristics and distribution by department of professors of a public university in Bahia, Brazil, 2016

Variables (n)	*n*	*%*
Sex (421)*		
Male	202	48.0
Female	219	52.0
Age (407)*		
25 to 46 years old	208	51.1
47 to 59 years old	199	48.9
Marital Status (418)*		
With a partner	295	70.6
Without a partner	123	29.4
With children (420)*		
No	125	29.7
Yes	295	70.3
Monthly Income (418)*		
Up to 10 minimum salary wages	145	34.7
More than 10 minimum salary wages	273	65.3
Department (422)*		
Physics	13	3.1
Education	32	7.6
Humanities and Philosophy	33	7.8
Technology	35	8.3
Exact Sciences	38	9.0
Applied Social Sciences	47	11.1
Biological Sciences	51	12.1
Literature and Arts	52	12.3
Health	121	28.7

*valid responses of variables, excluding losses.

Table 2 Characteristics of sleep quality, duration and complaints among professors from a public university in Bahia, Brazil, 2016

Variables (n)	*Frequencies*	
	n	*%*
Sleep quality** (408)*		
Good	158	38.7
Poor	250	61.3
Sleep hours (418)*		
7 to 8 hours	274	65.5
≤ 6 hours	144	34.5
Difficulty falling asleep (419)*		
Yes	253	60.4
No	166	39.6
Wake up at dawn (419)*		
Yes	129	30.6
No	292	69.4

(Continued)

Table 2 Continuation...

Variables (n)	*Frequencies*	
	n	*%*
Take sleeping pills (420)*		
Yes	26	6.2
No	394	93.8
Sleep during the day (421)*		
Yes	340	80.7
No	81	19.3
Wake up tired (417)*		
Yes	247	59.3
No	170	40.7
Snore (417)*		
Yes	193	46.3
No	224	53.7
Wake up in the middle of the night (420)*		
Yes	168	40.0
No	252	60.0
Wake up with a headache (421)*		
Yes	345	82.0
No	76	18.0
Tiredness for no perceived reason (420)*		
Yes	152	36.2
No	268	63.8
Restless sleep (421)*		
Yes	163	38.7
No	258	61.3

*valid responses of variables, excluding losses; **Mini-Sleep Questionnaire (MSQ)[10-11].

Among the sleep characteristics analyzed, difficulty falling asleep (60.4%), waking up tired (59.3%) and waking up with a headache (82.0%) were the most frequent (**Table 2**).

The highest poor sleep quality prevalence was observed among females (65.0%), aged 47 to 59 years (62.4%), among those who did not have a partner (68.0%), with children (63.2%), with an effective employment relationship (64.5%), with an exclusive work regime (62.3%), with a higher degree, doctorate and post-doctorate (61.5%), with more than 10 years at work (64.0%) and with more than one job (72.5%). However, only the variable having another job (PR: 1.39; 95% CI: 1.05-1.84) was statistically associated with poor sleep quality (**Table 3**).

Variables associated with poor sleep quality: irregular or insufficient time to practice leisure activities (PR: 1.43; 95% CI: 1.23-1.66), complaints of back pain (PR: 1.26; 95% CI: 1.06-1.50), musculoskeletal pain (PR: 1.33; 95% CI: 1.09-1.64), headache (PR: 1.38; 95% CI: 1.16-1.64), experiences of passive work (PR: 1.31; 95% CI: 1.01-1.72) and of high demands (PR: 1.44; 95% CI: 1.10-1.87) (**Table 4**).

In the analysis of the association between sleep quality according to the variables of interest assessed simultaneously in the multiple logistic regression analysis (MLRA), the following variables were significantly associated with poor sleep quality: irregular and/or insufficient time for the practice of leisure activities, 6 sleep hours or less, musculoskeletal pain, headache and the highly demanding work experience (high demands combined with low control at work). In the MLRA, considering the losses obtained in the study, a final amount of 316 observations was obtained (**Table 5**).

Table 3 Prevalence, prevalence ratio and confidence interval of poor sleep quality, according to sociodemographic and work characteristics among professors from a public university in Bahia, Brazil, 2016

*Variables (n)**	*Poor Sleep Quality*			
	n	*P (%)***	*PR****	*(95% CI)*****
Sex (407)*				
Male	109	56.7	1.00	---
Female	140	65.0	1.14	(0.97-1.34)
Age (394)*				
25 to 46 years old	120	58.5	1.00	---
47 to 59 years old	118	62.4	1.06	(0.90-1.25)
Marital Status (404)*				
With a partner	165	57.8	1.00	---
Without a partner	81	68.0	1.17	(1.00-1.37)
With children (406)*				
No	69	56.1	1.00	---
Yes	179	63.2	1.12	(0.94-1.34)
Employment relationship (408)*				
Substitute/visitor	210	60.6	1.00	---
Effective	40	64.5	1.06	(0.86-1.30)
Working hours (407)*				
40 hours or less per week	110	59.7	1.00	---
Exclusive dedication	139	62.3	1.04	(0.89-1.22)
Academic degree (407)*				
Bachelor/Specialization/ Master's	116	60.7	1.00	---
Doctoral/Post-doctoral	133	61.5	1.01	(0.87- 1.18)
Time working at the university (408)*				
Up to 10 years	113	58.2	1.00	---
More than 10 years	137	64.0	1.09	(0.94 - 1.28)
Another employment (122)*				
No	37	52.0	1.00	---
Yes	37	72.5	1.39	(1.05-1.84)

*valid responses of variables, excluding losses; **prevalence; ***prevalence ratio; ****95% confidence interval.

Table 4 Prevalence, prevalence ratio and confidence interval for poor sleep quality, according to the variables: time for leisure habits, pain complaints and work experiences according to the demand-control model among professors of a public university in Bahia, Brazil, 2016

*Variables (n)**	*Poor Sleep Quality*			
	n	*P(%)***	*PR****	*(95% CI)*****
Time for leisure (407)*				
Yes	209	58.3	1.00	---
No	41	83.6	1.43	(1.23 - 1.66)
Back Pain (320)*				
No	62	55.7	1.00	---
Yes	127	70.5	1.26	(1.06 - 1.50)
Musculoskeletal pain (331)*				
No	54	52.0	1.00	---
Yes	151	69.5	1.33	(1.09 - 1.64)
Headache (321)*				
No	79	53.7	1.00	---
Yes	130	74.2	1.38	(1.16 - 1.64)
Demand-control model (389)*				
Low demand	41	49.4	1.00	---
Passive work	60	65.2	1.31	(1.01 - 1.72)
Active work	74	57.8	1.17	(0.89 - 1.52)
High demand	52	71.2	1.44	(1.10 - 1.87)

*valid responses of variables, excluding losses; **prevalence; ***prevalence ratio; ****95% confidence interval (CI).

Table 5 Estimation of the model selected in the multiple logistic regression analysis among professors of a public university in Bahia, Brazil, 2016

Variables	*PR***	*(95% CI)****
Time for leisure activities		
Yes	1.00	-
No	1.31	1.10 – 1.56*
Sleep hours		
7 to 8 hours	1.00	-
≤ 6 hours	1.22	1.03 – 1.44*
Musculoskeletal pain		
No	1.00	-
Yes	1.27	1.01 – 1.60*
Headache		
No	1.00	-
Yes	1.30	1.07 – 1.56*
Work experience (DCM*****)		
Low demand at work	1.00	-
Passive work	1.20	0.89 – 1.60
Active work	1.20	0.90 – 1.61
High demand at work	1.34	1.02 – 1.77*

* p-value < 0.05; ** prevalence ratio; *** 95% confidence interval (CI); **** Demand-Control Model. Multiple logistic regression analysis with 316 observations analyzed.

Discussion

This study sought to estimate the frequency of poor sleep quality among professors, evaluating the factors related to sociodemographic, work, lifestyle and health characteristics and the psychosocial aspects of work associated with the observed sleep quality. The global prevalence of poor sleep was very high (61.3%), indicating that questions investigated in this study are relevant aspects, that deserve special attention among professors, because they are indirectly or directly related to various health problems that may result from harmful work conditions, which must be re-thought in the context studied.

The proportion of professors with altered sleep quality identified in this study was higher to the research conducted with high school teachers in Poços de Caldas, (46,7%)[2], with a elementary and high school teachers carried out in Londrina (54.3%)[8] and lower than that obtained in a study with professors from Porto Alegre, with a prevalence of 76.9%[14]. Cultural and contextual aspects of work must be considered in these places as possible justifications for the differences found. Anyhow, it can be said that, regardless of the study, the high frequencies found reinforce the compromised sleep quality among the professors surveyed in the referred studies.

Maintaining more than one job was associated with a higher prevalence of poor sleep quality. Professors, when exposed to this work condition, become more vulnerable to situations that demand greater work dedication and reduced sleep[15]. Spending more time in work-related activities, in addition to impairing the sleep quality, compromises professional performance, physical, psychological and mental well-being, and lifestyle habits, such as leisure[16-17].

The current context and organization of time spent in work activities have contributed significantly to changes in professors' health and sleep quality at the investigated university. In this study, the unavailability of time for leisure activities was associated with poor sleep quality.

A study conducted with elementary and high school teachers in Londrina-Paraná, Brasil[8] identified association between poor sleep quality and negative perception in relation to time for leisure and family. Another research observed that, due to the weekly teaching workload, it was practically impossible to comply with all the work demands[18]. They spent their time, that could be used for leisure and relaxing activities, fulfilling academic demands[18].

These findings confirm that, in the current work context, professors have less time for leisure, for social interaction and for creative work, given

that, even when they are in social and leisure environments, conversation about their work and exchange of academic information are common among them[19].

Poor sleep quality was also associated with sleep duration less than or equal to six hours. Similar results were identified in studies conducted with high school teachers and professors[20-22]. The association found may be a consequence of the reduction in sleep caused by work intensification, by technological developments that expanded the use of electronic devices and dissolved the limits between private and work life and, mainly, by the volume of demands to be met in teaching work[24-25].

It is noteworthy that the sleep quality, when inferior to human needs, favors the occurrence of problems that affect cognitive performance, generate psychological distress and alter the biological rhythm, causing serious problems for biopsychosocial health[26-28].

Complaints of headache and musculoskeletal pain, quite common among professors[28], were also associated with a higher prevalence of poor sleep quality, indicating the need for greater attention to the professors' health, as well as reflections on the consequences that these pains can have on the development of activities at the university[29].

A survey carried out with teachers from the municipal system of Salvador, in Bahia, Brazil, identified prevalence of musculoskeletal pain of 41.1% in lower limbs and 23.7% in upper limbs[30]. Another study, conducted with professors from a university in the northwest of Rio Grande do Sul, found a headache prevalence of 56.5% [29]. These findings reinforce that, in the work experience of a professor, a longer working day favors both occurrence of pain and partial sleep restriction, which maintain the frequency and pain complaints.

Pain can produce changes in sleep patterns and on lifestyle, compromising self-esteem, mood, emotional state, daily activities and work performance. Symptoms can manifest as signs of tension, fatigue, anxiety and emotional disturbances, commonly known as tension pain, caused by sleep deprivation, tiredness, stress and other situations that exceed the responsiveness of the organism[29-31].

The high demands at work also remained associated with poor sleep quality. This condition implies a high psychological demand and low control over work, frequently associated with different types of illnesses[32]. Literature has recorded evidence of an association between the psychosocial aspects of a high strain at work and sleep disorders among professors and other jobs[20,25,33-36].

Professors, when subjected to high demands, find it difficult to relax, calm thoughts related to work and start the phase of recovery and distance from the tensions experienced during the day. The continuous livingness of this experience generates greater physiological and cognitive excitement of the central nervous system, which can promote partial deprivation and/or delay the onset of sleep[35-37].

Thus, studies have shown that, although there may be some specificities among professors that differentiate them, attention should be paid, in higher education, to the psychosocial factors that produce or contribute to different health disorders, among them, sleep disorders[38-39].

The results obtained in this study allow reflections that can contribute to improve the organizational work conditions, the sleep quality, and, consequently, the physical and mental health of the professors at the researched university. However, some limitations should be considered.

The first one refers to the cross-sectional design, which makes it impossible to identify the temporal sequence between exposure and outcome. That is, it is not possible to assess whether the factors that supposedly led to poor sleep quality, in fact, preceded this event.

The prevalence used for the sample calculation may be another limitation. Until the investigation period of this study, we did not know others studies on sleep quality among professors curried out in Brazil, which led us to the use of the aforementioned reference data to calculate the sample[2]. In other words, although there are distinct characteristics between professors and teachers from different educational levels, there are similarities between them, constituting a common base that allows this use.

Measuring poor sleep quality through self-reported subjective answers is also another aspect that limits the data interpretation. Another limiting factor is the healthy worker bias, since the professors who were on leave due to vacation and/or illness were not included in the study. It is possible that professors with sleep problems, which produced more severe illness, may have been excluded from the study. Finally, the memory bias also needs to be considered, since there the participants needed to retrieve information from previously experiences.

As positive points, we highlight the research object importance to occupational health, as it was little explored, and the fact that the research was conducted in a representative sample of professors from a public university.

Conclusion

Falling asleep difficulties, waking up tired and with a headache are the most frequent sleep complaints among the studied professors. The high proportion of poor sleep quality among the professors is also quite worrying. The results show that the absence and/or irregularity of leisure time, the six or fewer hours sleep, the complaints of musculoskeletal pain and headache, and the experience of high demand at work are associated factors that favor a a higher prevalence of poor sleep quality among the participating professors. Therefore, health promotion actions that contribute to a better sleep quality are necessary. These actions should especially consider reordering the characteristics and organizational context of teaching work.

Thus, we understand that the exploration of this study's theme is of great importance for professors, as well as it positively contributes to collective health, with emphasis on occupational health. In addition, new studies in this theme can benefit the whole society, due to the importance of the work carried out in public universities. Therefore, good working, living and health conditions can lead to general well-being among professors.

Authors' contributions

Freitas AMC, Araújo TM, Pinho PS, Sousa CC, Oliveira PCS and Souza FO had a substantial contribution in the study's design, data collection, analysis and interpretation, in the manuscript writing and critical reviews, and in the approval of the final published version, and assume full public responsibility for the research and the content here published.

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