

Sleep pattern and perception of sleep quality among medical residents and the relation to anxiety and depression

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None

Objectives: To determine the prevailing sleep pattern and perception of sleep quality among medical residents in different specialties at a regional hospital and to explore their relation with several variables, especially with anxiety, depression, and psychoactive substance use on the other.

Methods: Cross-sectional observational survey of medical residents in Regional Hospital 25. The subjects gave their informed consent to participation. The instruments used were the Pittsburgh sleep quality index, a questionnaire on use of psychoactive substances, and the Goldberg anxiety and depression scale. Other variables explored were age, gender, year of residency training, specialty, sleep pattern, number of on-call days, outside work, and family or social obligations, and their relationship with the sleep pattern and quality.

Results: In the specialties of emergency medicine, anesthesiology, surgery, pediatrics and internal medicine, a total of 91.80% of the residents participated. The mean (SD) age was 25.6 (2.6) years; 53.6% of the respondents were men. Sleep pattern and quality significantly worsened after residence starting ($p < 0.001$), when short sleep pattern was present in 75.0% of residents and poor or very poor quality in 32,2%. Routine coffee drinking was reported by 87.5%, and 51.8% drank alcoholic beverages regularly; 37.5% were smokers. Signs of anxiety were detected in 46.4% and depression in 37.5%. A significant association was found between a short-sleep pattern and the specialty of emergency medicine (OR, 34.1), anxiety (OR, 18.2), and coffee intake (OR, 10.5). Poor or very poor sleep quality was associated with being in the first year of residency training (OR, 18.1), in the specialty of emergency medicine (OR, 6.0), anxiety (OR, 50.1), depression (OR, 6.2), outside work (OR 13.5), family or social obligations (OR 4.2) and alcohol (OR 8.2) and tobacco consumption (OR 6.2).

Conclusions: Both sleep pattern and quality deteriorate as residency training begins, and were associated to several factors, especially to anxiety and depression. [Emergencias 2010;22:33-39]

Key words: Sleep quality. Medical residents. Sleep disorders. Depressive disorders.

Introduction

Sleep is essential in our lives and is related with the physical, mental and psychological state of the individual¹. Individuals who regularly sleep an average of 7-8 hours per day (intermediate sleep pattern) often have better physical health and lower risk of early mortality or the development of diabetes, cardiopathy, or cognitive and psychological abnormalities, as compared with those who sleep less (short sleep pattern) or more (long sleep pattern)²⁻⁹. However, there are

many social, academic and work factors that may alter regular patterns of sleep. In the training of medical specialists or residents, one of the aspects attracting most attention is "duty shift", consisting of periods of continuous medical-care activity lasting 24 hours or more which frequently entails significant sleep deprivation¹⁰⁻¹³. After such a shift, the levels of daytime sleepiness are similar or even higher those of patients with narcolepsy or sleep apnea, and may promote the development of arrhythmias, dehydration and mood deterioration; these conditions

may be exacerbated by the habitual use of substances such as coffee or tobacco¹²⁻²². Moreover, sleep deprivation means that physicians in general and residents in particular are more prone to error in routine and repetitive tasks, and in situations that require sustained attention^{10,23-25}. In fact, the effects of sleep deprivation for task completion are similar to those of alcohol intoxication, such that task performance after 24 hours of continuous vigilance is equivalent to performing the task with an alcohol blood level of 0.10%²⁶; and results in diminished visual attention, reaction time, visual memory²⁷ and creative thinking^{28,29}.

Numerous American organizations have criticized the excessive number of hours that medical residents are required to devote to training and care activities; they have made proposals to reduce this to achieve greater productivity^{12,13}. A survey of more than 3,600 U.S. medical residents showed that total hours worked was significantly related to greater personal accident risks, medical decision-making errors, and conflict with other members of staff³⁰. A survey to assess the effects of duty shifts on health, quality of life and quality of healthcare in 500 resident physicians of 33 specialties in Spain found that these physicians had an average of 5.59 duty shifts per month and usually slept less than 4 hours per shift. The authors noted the frequent use of drugs to induce or prevent sleep, and high levels of anxiety and conflict between the residents themselves and even with members of hospital staff³¹. The specialties of anesthesiology³²⁻³⁵ and surgery³⁵⁻³⁸ are where most reports have been published regarding the deleterious effect of sleep deprivation on professional task performance by medical residents; they noted an increase in both the performance time required and the development of complications, as well as impaired physician-patient empathy and increased number of errors^{39,40}. These studies have not been performed among residents of medical specialties in Mexico. Although the Regional General Hospital 25 of the Mexican Institute of Social Security has performed some studies which found high levels of stress, anxiety and depression in residents training for the specialty of emergency medicine⁴¹⁻⁴³, none have been done to explore the predominant pattern and quality of sleep in medical residents of the above-mentioned hospital, nor related factors and their relationship with levels of anxiety and depression. These were, therefore, the objectives of this study.

Method

We performed a cross-sectional observational study, approved by the local research committee, of medical residents at a second-level hospital. The sample consisted of all informed residents who agreed to participate and signed the consent form. Three anonymous self-administered instruments were used in the survey:

a) The Pittsburgh Sleep Quality Index^{1,44}, with an internal consistency of 0.67-0.81, a sensitivity of 88.6% and a specificity of 74.2%. It explores subjective indicators of sleep for quality, latency, duration, habitual efficiency, alterations, use of hypnotic medication and daytime dysfunction, with a score for each of the components ranging from 0 (no difficulty) to 3 points (severe difficulty). The overall score has a range from 0 (no difficulty) to 21 points (difficulty in all areas) with a cutoff of 5 points to differentiate good sleepers from bad. The average response time of this instrument is 10 minutes.

b) A questionnaire to assess substance consumption⁴⁵. This is a self-report instrument that collects socio-demographic data, sleep habits, current and past medical and psychological situation, and the consumption of substances that potentially affect them. The instrument provides an overall rating of sleep quality and partial scores from 7 different components (subjective sleep quality, latency, duration, habitual efficiency, alterations, hypnotic drug use and daytime dysfunction).

c) The Goldberg scale of anxiety and depression, which has a Cronbach's alpha of 0.89. It is both a detection test, with care and epidemiological uses, and a guide to questioning. This instrument serves not only to diagnose anxiety or depression (or both) but also discriminates between them and measures their respective intensities. It contains 2 subscales with nine questions in each: a subscale of anxiety (defined as the emotional state in which the subject experiences a permanent sense of despair for reasons not consciously known) and a subscale of depression (defined as an emotional state characterized by a weakening or decrease of mood, intellectual and even physical state; altered view of self-worth, self-esteem, and how one thinks). The first 4 questions of each subscale, act as a precondition for determining whether to attempt to answer the remaining questions, and require at least two affirmative responses in either subscale before proceeding to answer the remaining questions. Cutoff scores are 4 or

higher on the anxiety subscale and 2 on that of depression; the higher the score, the more severe the problem (with a maximum of 9 for each subscale)⁴⁶.

In addition, we also studied the variables age, sex, academic level, specialty, sleep pattern prior to starting residency and during it, call shifts performed, work other than residency, and family or social obligations. We considered that residents who slept an average of 7-8 hours per day had an intermediate sleep pattern, those who slept less than 7 hours per day had a short sleep pattern, and those who slept for more than 8 hours per day had a long sleep pattern²⁻⁹. All questions referred to the month immediately before. We excluded residents with a longstanding history of sleep disorder, anxiety or depression. The pattern and quality of sleep were considered the dependent variable while the rest were considered as independent variables.

Descriptive statistics with absolute numbers and percentages were used for qualitative variables, and mean and standard deviation were used for quantitative variables. For inferential statistics, Chi² test was used after converting all quantitative variables into binary data. In the tables above 2 x 2 and with ordinal ranking categories, we used linear trend Chi² test to detect increasing or decreasing association. Odds ratio (OR) values and their 95% confidence intervals (95% CI) were calculated. Differences with a p value less than 0.05 were considered statistically significant, and the 95% CI of the OR excluded the value 1.

Results

A total of 56 (91.8%) residents of the 5 specialties (emergency medicine, internal medicine, pediatrics, surgery and anesthesia) training at this hospital agreed to participate, predominantly those from the specialty of emergency (57.1%) and in their first academic year (62.5%) (Table 1).

Table 2. Effect of starting residency on the pattern and quality of sleep in the 56 resident physicians assessed

	Before residency (n = 56)	During residency (n = 56)	P*
Sleep pattern n (%)			< 0.001
Short (<7 hours a day)	5 (8.9)	42 (75.0)	
Intermediate (7-8 hours per day)	37 (66.1)	12 (21.4)	
Long (> 8 hours per day)	14 (25.0)	2 (3.6)	
Quality of sleep n (%)			< 0.001
Good	51 (91.1)	19 (33.9)	
Fair	3 (5.4)	19 (33.9)	
Poor or very poor	2 (3.6)	18 (32.2)	

*Calculated by linear trend Chi² test.

Participant age ranged between 23 and 36 years, with a mean of 25.6 ± 2.6 years, and 53.6% were men. Two thirds (66.1%) reported intermediate sleep pattern before residency, while during residency there was a significant shift towards short sleep patterns, with up to 75% of residents reporting a short pattern. Regarding quality of sleep, before residency 91.1% reported good quality, while during residency there was a significant change to inferior quality, with 32.1% reporting poor or very poor quality of sleep (Table 2).

The number of shifts on duty performed in the previous month was 6-12, with a mean of 8.1 ± 3.1 . The specialty with the highest number of shifts was EM (11.3 per month), while that with the lowest was pediatrics (9.0). Only 12.5% of the residents reported working in activities outside residency, while up to 44.6% reported fulfilling obligations. During residency the average hours of actual sleep was 5.5, and required 35.12 minutes to achieve. The great majority (87.5%) of residents reported regular coffee use, 51.8% drank alcoholic beverages and 37.5% smoked cigarettes.

Up to 46.4% of the residents showed anxiety traits while 37.5% had depression traits. While the prevalence rate of both psychopathological traits was associated with significant decrease in quality of sleep, this relationship was not observed with sleep patterns (Figure 1).

Table 1. Specialties and academic year of the 56 residents assessed on the influence of the subjective pattern and quality of sleep on anxiety and depression

Level	Total n (%)	Specialty				
		Emergency medicine	Internal medicine	Pediatrics	Anesthesiology	Surgery
First year	35 (62.5)	11	7	4	6	7
Second year	9 (16.1)	9	0	0	0	0
Third year	12 (21.4)	12	0	0	0	0
Total n (%)	56 (100)	32 (57.1)	7 (12.5)	4 (7.1)	6 (10.7)	7 (12.5)

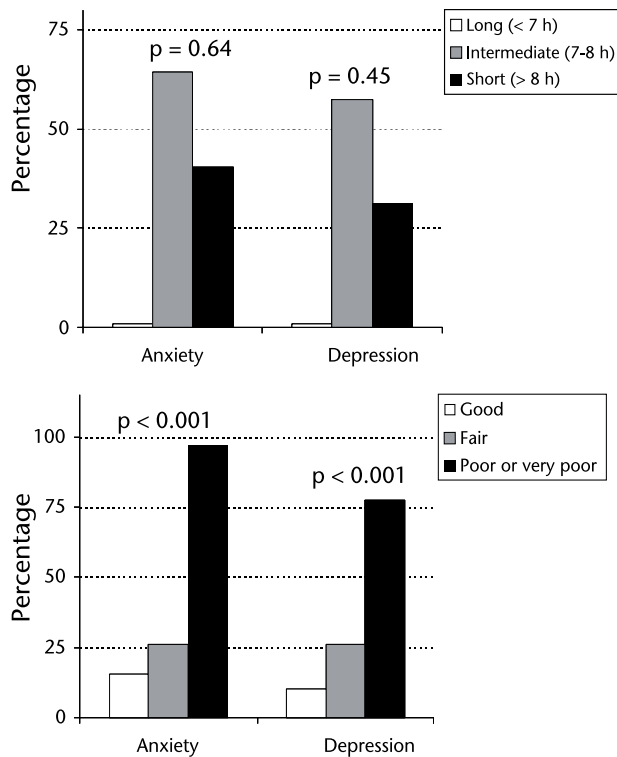


Figure 1. Relationship between patterns (top) and quality (bottom) of sleep and incidence of anxiety and depression (the value p was calculated using linear trend χ^2 test).

The variables showing a significant relationship with short sleep pattern (Table 3) were the specialty of emergency (OR 34.1), anxiety (OR 18.2) and the consumption of coffee (OR 10.5). In addition, the variables associated with poor or very poor quality of sleep (Table 4) were the presence of anxiety (OR 50.2), the first year of residence (OR 18.1), having other jobs outside residency (OR 13.5), alcohol consumption (OR 8.2), smoking (OR 6.2), the specialty of emergency medicine (OR 6.0), fulfilment of family and social obligations (OR 4.2) and depression (OR 6.2), while age than 30 years acted as a protective factor (OR 0.06).

Discussion

It is widely acknowledged that physician residency fulfils a double function: on the one hand the residents perform a significant patient care role and, on the other, they are responsible for their own training process as specialists. The current model of training for medical residents provides a number of advantages, such as direct contact with patients and physicians with more experience. But it also has several drawbacks,

most notably the gruelling pace of work these future specialists must endure. This system has been criticized by both patients and professionals^{30,31,35-40}.

Our study shows that the residency is associated with worsening of the pattern and quality of sleep. This is no surprise considering the activities and requirements specific to different specialties, as well as large workloads and other activities to which these residents are not accustomed and which disrupt their habits and customs. The really important aspect is that we now know that there is a point where fatigue not only impedes the acquisition of new knowledge, but also impedes the application of existing knowledge: this situation requires the right balance between time spent on training through healthcare activities, non-healthcare activities and time devoted to rest.

It is a fact that the long hours involved in medical specialties are conducive to the consumption of various legal stimulants, as reflected in the high frequency of consumption of coffee, tobacco and / or alcohol reported by our population, with obvious impact on the pattern and quality of sleep, a situation that must be considered in itself and the potential consequences for the general health of our physicians.

In line with other authors, we found high levels of anxiety and depression associated with short patterns and poor quality of sleep, which could affect academic and work performance, but also compromise patient safety and that of the physician^{12,13,30}. It is accepted that individuals with satisfactory sleep present, in the long term, less anxiety¹, and although it may be unrealistic and even undesirable to think that hospital duty shifts may eventually disappear, it is crucial to establish strategies and policies regarding the activities and time allocated to this important healthcare and academic activity to optimize them. This would help to develop better educational processes for quality care without affecting the health of resident physicians. Therein lies the challenge.

We conclude that sleep changes significantly on entering residency, tending towards short sleep pattern and worse quality, and that among the factors associated with poor sleep pattern are the specialty of emergency medicine, anxiety and coffee consumption. Poor quality of sleep was associated with first year residency, the specialty of emergency medicine, other work outside residency, family and social obligations met, consumption of tobacco and alcohol, anxiety and depression. The levels of anxiety and depression were higher than those reported previously and were related to short sleep pattern and poor quality of sleep.

Table 3. Factors associated with short sleep patterns

	Total (N = 56)	Residents with short sleep (n = 42)	Others (n = 14)	p	Odds ratio (95% CI)
Sex [n (%)]					
Men	30 (53.5)	23 (54.8)	7 (50.0)	0.760	1.20 (0.34-4.22)
Women	26 (46.5)	19 (45.2)	7 (50.0)		1 (reference)
Age [n (%)]					
< 30 years	49 (87.5)	38 (90.5)	11 (78.6)	0.290	2.54 (0.42-14.15)
≥ 30 years	7 (12.5)	4 (9.5)	3 (21.4)		1 (reference)
Year of residency [n (%)]					
First	34 (60.7)	21 (50.0)	13 (92.8)	0.003	0.07 (0.003-0.52)
Second or third	22 (39.3)	21 (50.0)	1 (7.2)		1 (reference)
Specialty [n (%)]					
Emergency Medicine	32 (57.1)	31 (73.8)	1 (7.2)	< 0.001	34.09 (5.12-807.2)
Other specialties	24 (42.8)	11 (26.2)	13 (92.8)		1 (reference)
Duty shifts performed monthly [n (%)]					
≥ 6	45 (80.3)	34 (81.0)	11 (78.6)	0.832	1.15 (0.21-5.09)
< 6	11 (19.6)	8 (19.0)	3 (21.4)		1 (reference)
Other work outside residency [n (%)]					
Yes	8 (13.7)	7 (16.7)	1 (7.2)	0.432	2.56 (0.35-99.9)
No	48 (86.3)	35 (83.3)	13 (92.8)		1 (reference)
Family and social obligations [n (%)]					
Yes	31 (55.3)	20 (47.6)	11 (78.6)	0.05	0.25 (0.05-1.00)
No	25 (44.6)	22 (52.4)	3 (21.4)		1 (reference)
Consumption of tobacco [n (%)]					
Yes	21 (37.5)	18 (42.9)	3 (21.4)	0.167	2.70 (0.68-13.62)
No	35 (62.5)	24 (57.1)	11 (78.6)		1 (reference)
Coffee consumption [n (%)]					
Yes	49 (87.5)	40 (95.2)	9 (69.2)	< 0.01	10.46 (1.78-88.47)
No	7 (12.5)	2 (4.8)	5 (30.8)		1 (reference)
Alcohol consumption [n (%)]					
Yes	29 (51.8)	22 (52.4)	7 (50.0)	0.882	1.09 (0.31-3.83)
No	27 (48.2)	20 (47.6)	7 (50.0)		1 (reference)
Anxiety [n (%)]					
Yes	26 (46.4)	25 (59.5)	1 (7.2)	< 0.001	18.25 (2.80-424.8)
No	30 (53.6)	17 (40.5)	13 (92.8)		1 (reference)
Depression [n (%)]					
Yes	21 (37.5)	8 (19.0)	13 (92.8)	< 0.001	0.01 (0.001-0.136)
No	35 (62.5)	34 (81.0)	1 (7.2)		1 (reference)

Finally, considering that most of the variables associated with impaired sleep are common in normal residency training, strategies are required to lessen the negative effects these factors could have on the quality and pattern of sleep and their consequent impact on the presence of anxiety and depression in residents, mainly considering rescheduling, if possible, of academic and health-care activities.

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Table 4. Factors associated with poor or very poor quality of sleep

	Total (N = 56)	Residents with poor or very poor sleep quality (n = 18)	Other residents (n = 38)	p	Odds ratio (95% CI)
Sex [n (%)]					
Men	30 (53.5)	13 (72.2)	17 (44.4)	0.06	3.14 (0.95-11.61)
Women	26 (46.5)	5 (27.8)	21 (55.6)		1 (reference)
Age [n (%)]					
< 30 years	49 (87.5)	12 (66.7)	37 (97.4)	< 0.01	0.06 (0.002-0.44)
≥ 30 years	7 (12.5)	6 (33.3)	1 (2.6)		1 (reference)
Year of residence [n (%)]					
First	34 (60.7)	17 (94.4)	18 (47.4)	< 0.001	18.07 (2.82-416.8)
Second or third	22 (39.3)	1 (5.6)	20 (52.6)		1 (reference)
Specialty of the residence [n (%)]					
Emergency Medicine	32 (57.1)	15 (83.3)	17 (44.4)	< 0.01	5.98 (1.57-29.61)
Other specialties	24 (42.8)	3 (16.7)	21 (55.6)		1 (reference)
Duty shifts performed monthly [n (%)]					
≥ 6	45 (80.3)	17 (94.4)	28 (73.7)	0.07	5.92 (0.87-140.2)
< 6	11 (19.6)	1 (5.6)	10 (26.3)		1 (reference)
Other work outside residency [n (%)]					
Yes	8 (13.7)	5 (27.8)	3 (7.9)	0.01	13.48 (1.68-346.4)
No	48 (86.3)	13 (72.2)	35 (92.1)		1 (reference)
Family and social obligations [n (%)]					
Yes	31 (55.3)	14 (77.8)	17 (44.4)	< 0.05	4.21 (1.20-17.32)
No	25 (44.6)	4 (22.2)	21 (55.6)		1 (reference)
Consumption of tobacco [n (%)]					
Yes	21 (37.5)	17 (94.4)	4 (10.5)	< 0.01	6.19 (1.83-22.89)
No	35 (62.5)	1 (5.6)	34 (89.5)		1 (reference)
Coffee consumption [n (%)]					
Yes	49 (87.5)	17 (94.4)	32 (84.2)	0.323	3.13 (0.42-77.89)
No	7 (12.5)	1 (5.6)	6 (15.8)		1 (reference)
Alcohol consumption [n (%)]					
Yes	29 (51.8)	15 (83.3)	14 (36.8)	0.001	8.22 (2.14-41.07)
No	27 (48.2)	3 (16.7)	24 (63.2)		1 (reference)
Anxiety [n (%)]					
Yes	26 (46.4)	17 (94.3)	9 (23.7)	< 0.001	50.15 (7.58-1189)
No	30 (53.6)	1 (5.6)	29 (76.3)		1 (reference)
Depression [n (%)]					
Yes	21 (37.5)	12 (66.7)	9 (23.7)	< 0.01	6.19 (1.83-22.89)
No	35 (62.5)	6 (33.3)	29 (76.3)		1 (reference)

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Patrón y calidad subjetiva de sueño en médicos residentes y su relación con la ansiedad y la depresión

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Objetivos: Determinar el patrón y la calidad de sueño predominante en médicos residentes de diferentes especialidades de un hospital regional, así como su relación con distintas variables especialmente con ansiedad, depresión y el consumo de sustancias.

Métodos: Estudio observacional del tipo transversal en el que se aplicaron a médicos residentes los siguientes instrumentos: "Índice de calidad del sueño de Pittsburgh", "Cuestionario para evaluar el consumo de sustancias" y "Escala de ansiedad y depresión de Goldberg". También se recogió la edad, sexo, grado académico, especialidad, patrón de sueño, guardias realizadas, y trabajos y actividades familiares o sociales ajenas a la residencia. Se estudió si alguna variable se asociaba con un patrón corto de sueño o con una calidad mala-muy mala del mismo.

Resultados: Participaron el 91,8% de los residentes de las especialidades de urgencias, anestesiología, cirugía, pediatría y medicina interna. La edad fue de $25,6 \pm 2,6$ años y el 53,6% eran varones. Tanto el patrón como la calidad del sueño se deterioraron significativamente tras iniciar la residencia ($p < 0,001$), donde el patrón fue corto en el 75,0% de los casos y la calidad mala-muy mala en el 32,2%. El 87,5% consumían café, el 51,8% bebidas alcohólicas, el 37,5% cigarrillos, el 46,4% mostraron rasgos de ansiedad y el 37,5% de depresión. Se encontró asociación significativa de los patrones de sueño corto y especialidad de urgencias (OR 34,1), ansiedad (OR 18,2) y consumo de café (OR 10,5); y entre la calidad de sueño mala-muy mala y el primer año de la de residencia (OR 18,1), especialidad de urgencias (OR 6,0), ansiedad (OR 50,2), depresión (OR 6,2), tienen trabajos ajenos a la residencia (OR 13,5), cumplir con actividades familiares y sociales (OR 4,2) y consumo de alcohol (OR 8,2) y de tabaco (OR 6,2).

Conclusiones: El patrón y calidad de sueño de los médicos se deteriora al iniciar la residencia, y se asociaban a diversos factores, especialmente a ansiedad y depresión. [Emergencias 2010;22:33-39]

Palabras clave: Calidad de sueño. Residentes. Trastornos de ansiedad. Trastornos depresivos.