Excessive daytime sleepiness in patients with acute myocardial infarction

Sonolência diurna excessiva nos pacientes com infarto agudo do miocárdio

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Keywords
Sleep; Disorders of excessive somnolence; Myocardial infarction; Risk factors

Descritores
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Abstract

Objective: To characterize daytime sleepiness in patients with acute myocardial infarction and identify the sociodemographic and clinical characteristics associated with excessive daytime sleepiness in these patients.
Methods: A cross-sectional study with 113 patients (mean age of 59.7 years; 70.8% male), in which were used an instrument for the sociodemographic and clinical characterization, and the Epworth Sleepiness Scale.
Results: Excessive daytime sleepiness was identified in 33 patients (29.2%). Those with a body mass index above 30 kg/m^2 and those who progressed to clinical worsening obtained a higher score in the Epworth Sleepiness Scale, compared to those with a body mass index less than 30 kg/m^2 and clinical improvement. The patients aged 60 years or more, those separated, and with body mass index greater than 30 kg/m^2 were more likely to mention excessive daytime sleepiness.
Conclusion: Identifying individuals with excessive daytime sleepiness should be part of the routine work of nurses for the prevention of cardiovascular diseases.

Resumo

Objetivos: Caracterizar a sonolência diurna em pacientes com infarto agudo do miocárdio e identificar as características sociodemográficas e clínicas associadas à sonolência diurna excessiva nesses pacientes.
Métodos: Estudo transversal com 113 pacientes (média de idade 59,7; 70,8% sexo masculino). Utilizou-se um instrumento para caracterização sociodemográfica e clínica e a Escala de Sonolência de *Epworth*.
Resultados: A sonolência diurna excessiva foi identificada em 33 pacientes (29,2%). Aqueles com índice de massa corporal acima de 30kg/m^2 e aqueles que evoluíram com piora clínica obtiveram escore superior na Escala de Sonolência *Epworth*, comparados àqueles com índice de massa corporal inferior a 30kg/m^2 e melhora clínica. Os pacientes com 60 anos ou mais, os separados e aqueles com índice de massa corporal superior a 30kg/m^2 apresentaram chances maiores de referir sonolência diurna excessiva.
Conclusão: Identificar indivíduos com sonolência diurna excessiva deve constituir parte da atuação rotineira do enfermeiro visando à prevenção das doenças cardiovasculares.

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Introduction

Cardiovascular diseases are the leading causes of mortality and morbidity in the world.[1] It is estimated that about 83.6 million American adults have one or more cardiovascular diseases.[2]

The risk factors for acute myocardial infarction (AMI) are widely known, such as smoking, high serum levels of cholesterol and other lipids, obesity, diabetes mellitus and a sedentary lifestyle, among others.[1] Recently, the sleep of insufficient quality or quantity has been pointed as an additional risk factor for cardiovascular diseases.[3-5] It has been demonstrated that sleep disorders contribute to the onset and aggravation of cardiovascular diseases.[6,7]

Excessive daytime sleepiness is a frequent complaint that may result from different disorders or changes in sleep,[8] and is used as an indirect measure of those alterations.[3] It is defined as the increased propensity to sleep in circumstances deemed inappropriate,[9] needing naps during the day.[10]

Studies show the association of excessive daytime sleepiness with cardiovascular events,[3,10-14] resulting in an increase of 33% for the risk of mortality.[6] A screening for the presence of excessive daytime sleepiness can contribute to detect individuals at high risk for these diseases.

Based on the above, this study aimed to characterize daytime sleepiness in patients with AMI and to identify the sociodemographic and clinical characteristics associated with excessive daytime sleepiness.

Methods

This is a descriptive, analytical and cross-sectional study carried out between October 2013 and March 2014 in the coronary care unit and in the cardiology ward of a public teaching hospital in the countryside of the state of São Paulo. It included patients with AMI with or without ST-segment elevation, of both sexes, aged over 18 years, admitted to the coronary care unit or the cardiology ward within 72 hours of admission to hospital.

The sample size was estimated for a study of greater range about sleep quality, daytime sleepiness and risk for sleep apnea in patients with AMI, from where the present study was extracted. It was used a methodology proposed for calculating the sample size for an unpaired t-test, considering a study in which the group of subjects with clinical improvement had an average of 7.2 points and a standard deviation of 4.4 points in the score of the instrument that assesses the sleep quality, and those with clinical worsening obtained an average of 10.3 and a standard deviation of 3.8 points in the ratio of 15% of subjects with clinical worsening;[15] significance level of 5%; power of 80%. The calculated sample size was of 121 subjects, among which 18 should present clinical worsening.

Daytime sleepiness was assessed using the Epworth Sleepiness Scale (ESS-BR), which estimates the probability of falling asleep in eight situations involving daily activities.[9] Values between zero and three are assigned to the answers, and their sum results in the final score. Such score varies from zero to 24, and scores above 10 are indicative of excessive daytime sleepiness.[9] The instrument version validated in Brazil was used, and its internal consistency measured by Cronbach's alpha was 0.76.[9]

The sociodemographic and clinical characteristics were obtained by means of an instrument developed by the authors and submitted to apparent validation by three judges skilled on the covered subjects. The following variables were used for the sociodemographic and clinical characterization: gender, age, marital status, education, family income, current employment status, body mass index (BMI) calculated from the referred weight and height, smoking habits, alcohol consumption, physical activity, waist circumference, neck circumference, hypertension, hypercholesterolemia, diabetes mellitus, reported depression, previous acute myocardial infarction, stroke and clinical course.

The variables of alcohol intake, waist circumference and neck circumference were considered as cardiovascular risk factors in the following cases (respectively): when the amount of ethanol intake was above 30 mg/dl per day for men and 15 mg/dL for women;[16] waist circumference with values above 94 centimeters for men and 80 cm for women,[17] and neck circumference greater than 43cm for men and greater than 38cm for women.[18] The variable of physical activity was considered present when the patient reported practice of physical exercise like walking, swimming, cycling and the like, in the minimum frequency of three times a week and duration of 30 minutes each session.

Data were collected through interviews with patients and analysis of the medical records, in up to 72 hours from patients' admission. All the variables of sociodemographic and clinical characterization, except education, family income and current work situation, were used as independent variables in the inferential analysis.

The clinical course was accompanied until the end of hospitalization and categorized as clinical improvement or worsening. The events of interest considered as clinical worsening were reinfarction, angina, cerebrovascular accident and cardiovascular death.

Data were analyzed using the Statistical Analysis System (SAS) version 9.2, with the help of a professional statistician. The data analysis was performed using descriptive (measures of central tendency and dispersion, frequencies and proportions) and inferential statistics. According to examined sociodemographic and clinical variables, the comparisons between the final scores of the Epworth Sleepiness Scale were performed with the Mann-Whitney or Kruskal-Wallis tests. The univariate and multiple logistic regression analysis was used to identify factors associated with excessive daytime sleepiness, having the daytime sleepiness as a dependent variable (excessive with the final score of the Epworth Sleepiness Scale exceeding 10). The stepwise method was used for the variable selection. The p value was set at 0.05 for considering the results of inferential analyzes as significant.

The development of the study met the national and international standards of ethics in research involving human beings.

Results

The study included 113 patients, aged 59.7 years on average, and ranging between 36-88 years, with predominance of the male gender (Table 1).

The excessive daytime sleepiness (final score of the Epworth Sleepiness Scale above 10 points) was identified in 33 (29.2%) of the 113 patients studied. The average overall score was 8.9 (SD = 4.5, median 9.0). Comparisons between the total scores of the Epworth Sleepiness Scale according to the variables are shown in table 2.

The result of the multiple logistic regression analysis showed that the variables of age, marital status and BMI were significantly associated with the presence of excessive daytime sleepiness (Table 3).

Table 1. Sociodemographic and clinical characteristics of the sample of patients with acute myocardial infarction

Variable	n=113
Age (years), mean ± SD	59.7 ± 12.3
Gender, n (%)	80(70.8)
Married/common-law marriage, n (%)	86(76.1)
Active work, n (%)	68(60.2)
Family income in MW*, mean ± SD	3.7(3.3)
Level of education in complete years, mean ± SD	5.7 ± 4.4
Body mass index >30kg/m², n (%)	26(23.0)
Smoking, n (%)	44(38.9)
Risky alcohol consumption, n (%)	20(17.9)
Physical activity practice, n (%)	19(16.8)
Increased waist circumference, n (%)	66(58.4)
Increased neck circumference, n (%)	26(23.0)
Hypertension, n (%)	87(77.0)
Diabetes mellitus, n (%)	40(35.4)
Hypercholesterolemia, n (%)	48(42.5)
Depression, n (%)	9(8.0)
Acute myocardial infarction with ST elevation, n (%)	60(53.1)
Previous episode of acute myocardial infarction, n (%)	32(28.3)
Outcome with clinical worsening, n (%)	14(12.4)

*MW – minimum wage R$ 678.00

Table 2. Descriptive statistics and p-value of the comparisons between the scores of the Epworth Sleepiness Scale of the sociodemographic and clinical variables

Sociodemographic and Clinical variables	Final scores of the Epworth Sleepiness Scale				
	Mean (SD)	Q1	Mediana	Q3	p-value
Gender					0.136*
Male	9.1(4.0)	7.0	9.0	11.0	
Female	8.4(5.4)	4.0	7.0	10.0	
Age group					0.173*
Up to 60 years	8.1(3.2)	6.0	8.0	10.0	
60 years or older	9.7(5.3)	6.0	9.0	12.5	
Marital status					0.153†
Married	8.4(4.1)	6.0	8.0	22.0	
Single	10.5(2.7)	9.0	10.0	16.0	
Widowed	9.4(6.1)	5.0	8.5	19.0	
Separated	10.9(6.2)	6.0	12.0	19.0	
Body mass index					0.042*
≤ 30kg/m²	8.5(4.3)	6.0	8.0	10.0	
≥ 30kg/m²	10.4(4.6)	7.0	10.0	12.0	
Smoking habits					0.241†
Non-smoking	8.9(4.3)	6.0	9.0	11.0	
Smoker	8.0(3.4)	6.0	7.0	10.0	
Former smoker	9.8(5.3)	6.0	10.0	12.0	
Risky alcohol consumption					0.827*
Yes	8.1(3.2)	7.0	9.0	10.5	
No	9.1(4.7)	6.0	9.0	11.0	
Hypertension					0.845*
Yes	9.1(4.8)	6.0	9.0	12.0	
No	8.2(2.8)	7.0	8.5	11.0	
Diabetes					0.140*
Yes	9.8(4.5)	7.0	9.0	12.5	
No	8.4(4.4)	6.0	8.0	11.0	
Hypercholesterolemia					0.780*
Yes	9.0(4.7)	6.0	9.0	11.0	
No	8.8(4.3)	6.0	8.0	11.0	
Type of AMI					0.678*
Without ST elevation	9.3(4.9)	6.0	9.0	11.0	
With ST elevation	8.5(4.0)	6.0	9.0	11.0	
Previous AMI					0.245*
Yes	10.2(5.5)	6.5	9.0	13.0	
No	8.4(3.9)	6.0	9.0	11.0	
Depression					0.257*
Yes	7.1(5.4)	3.0	4.0	12.0	
No	9.0(4.4)	6.0	9.0	11.0	
Physical activity practice					0.556*
Yes	8.2(3.4)	6.0	7.0	10.0	
No	9.0(4.6)	6.0	9.0	11.0	
Risky waist circumference					0.050*
Yes	9.8(4.7)	7.0	9.0	12.0	
No	7.6(3.8)	6.0	7.0	11.0	
Risky neck circumference					0.704*
Yes	9.0(5.3)	6.0	7.0	12.0	
No	8.8(4.2)	6.0	9.0	11.0	
Clinical course					0.035*
Improvement	8.6(4.3)	6.0	8.0	11.0	
Worsening	11.1(4.8)	8.0	11.0	14.0	

*Mann-Whitney test; † Kruskal-Wallis test; AMI - Acute myocardial infarction

Table 3. Significant results of the multiple logistic regression for the presence of excessive daytime sleepiness in patients with acute myocardial infarction

Variables Sociodemographic and clinical	Excessive daytime sleepiness				
	Absent	Present	p-value	OR*	C.I. 95%†
	n(%)	n(%)			
Age group					
Up to 60 years	45(78.9)	12(21.1)	-	1.00(ref)	-
60 years or older	35(62.5)	21(37.5)	0.016	3.43	1.25;9.45
Marital status					
Married	66(76.7)	20(23.3)	-	1.00(ref)	-
Single	5(62.5)	3(37.5)	-	2.94	0.56;15.34
Widowed	5(62.5)	3(37.5)	-	1.44	0.29;7.20
Separated	4(36.4)	7(63.6)	0.021	9.23	2.17;39.27
Body mass index					
≤ 30kg/m²	66(75.9)	21(24.1)	-	1.00(ref)	-
> 30kg/m²	14(53.8)	12(46.2)	0.001	5.79	1.95;17.23

* OR - *odds ratio* or *odds ratio* for the presence of excessive daytime sleepiness; †C.I. 95% - confidence interval for the OR

Discussion

Some limitations can be identified in this study, such as the following: the cross-sectional design, which prevents the evaluation of variables over time and the proposition of causal relations between them; the daytime sleepiness was assessed by self-report, which may result in lower accuracy of the identification of this symptom; although the calculated sample size was not reached, it was 93.4% of the desired total.

The results of this study, combined with the findings described in the literature, suggest that excessive daytime sleepiness is not a harmless symptom and should be routinely investigated in the clinical evaluation performed by nurses, especially in patients who have had acute myocardial infarction.

After detecting the excessive daytime sleepiness, the nurses in a multidisciplinary team may propose interventions to act on potentially modifiable factors, such as weight loss. Additionally, they can further investigate the possible underlying causes, requiring that patients fill out a sleep diary and report their routines. From these data, the professionals can guide changes of inadequate behaviors and habits related to sleep, or refer individuals to a specialized assessment that may include polysomnography, for example.

It is noteworthy that studies on daytime sleepiness and AMI are scarce, and objective studies for

identifying excessive daytime sleepiness (polysomnography and multiple sleep latency test) are expensive and not very accessible. These aspects emphasize the importance of nurses using resources such as the Epworth Sleepiness Scale in their daily work, permitting a rapid assessment that can contribute to the screening of individuals in need of further investigation.

The study sample consisted of 113 patients with acute myocardial infarction, predominantly married, male, active workers, with low education and family income. Among the clinical factors considered as risk for AMI were prevalent the sedentary lifestyle (83.2%), hypertension (77.0%), increased waist circumference (58.4%), hypercholesterolemia (42.5%), smoking (38.9%) and diabetes (35.4%). A case-control study carried out in 52 countries with 29,972 individuals, showed nine risk factors, including smoking, hypertension, diabetes, abdominal obesity, physical inactivity, alcohol consumption and dyslipidemia associated with 90% of risk for AMI.[19]

Regarding the excessive daytime sleepiness, 33 patients (29.2%) in this study had scores indicating it. This percentage is higher than in population studies, which obtained a prevalence of around 10%-18%.[6,7] It is suggested that this difference is due to the fact of this study having people with clinical impairment as subjects, AMI in the case. The main and most common cause of daytime sleepiness is chronic sleep deprivation or poor sleep quality, considered non-restorative. Excessive daytime sleepiness can be caused by various sleep disorders including OSAS (Obstructive Sleep Apnea Syndrome), as well as the use of medication.[8]

Considering that in this study, the scores obtained in the Epworth Sleepiness Scale were significantly higher for individuals who had clinical worsening after AMI than for those with improvement, it stands out that the monitoring of daytime sleepiness is indispensable, regardless of its causes. This symptom has been suggested as a risk factor for the aggravation of cardiovascular diseases, still poorly investigated in clinical evaluations in conjunction with other factors,[6,13] and the results of this study corroborate these findings. It is noteworthy that in longitudinal studies, the authors showed that subjects with excessive daytime sleepiness were at increased risk for cardiovascular diseases[14,20] and AMI.[6]

The scores obtained in the Epworth Sleepiness Scale were higher for males and the age group of 60 years or older, which is similar to the results found in other studies,[6,21-23] though not reaching statistical significance.

With regard to physical activity, the sedentary subjects had slightly higher average scores in the Epworth Sleepiness Scale when compared to active individuals. Physical activity is recommended to improve health, and helps to reduce other cardiovascular risk factors.[24] The sedentary lifestyle in turn, may be associated with increased waist circumference and obesity,[19] increasing the chances of occurrence of these two risk factors and thus, of cardiovascular disease. A recent study with 168 elderly showed that waist circumference in men is associated with excessive daytime sleepiness,[25] illustrating how the relationships between these factors are intertwined. Thus, a sedentary lifestyle may contribute to the increased cardiovascular risk in various ways, since it is associated, to obesity, increased waist circumference, and excessive daytime sleepiness, among other factors.

In this study, it was observed a chance 3.43 times greater of presenting excessive daytime sleepiness among individuals aged 60 years or older, compared to those under 60 years. These results are consistent with those found in other studies, where age appears as one of the predictors of excessive daytime sleepiness.[6,21] In a study with 2,110 adults in the general population, the proportion of sleep complaints increased with age, and 71% of subjects older than 45 years reported at least one complaint.[26] With these findings, is emphasized the recommendation of including the assessment of sleep quality and monitoring of daytime sleepiness during the clinical assessment of the elderly. In this regard, it is worth noting the studies showing that complaints of daytime sleepiness are a significant risk factor for cardiovascular disease or its aggravation, and this cannot be treated as a harmless condition associated to what is considered as 'normal' aging.

The separated individuals had a chance 9.23 times greater of presenting excessive daytime sleepiness than the other marital status (married, single and widowed). The authors point out that separated people have more sleep problems, and that marital cohabitation can influence the quality of sleep.[27] It is important to evaluate these people for the presence of daytime sleepiness and its possible causes, which may be due to an unstructured life routine, conducive to poor sleep and daytime sleepiness.

As for the BMI, a chance 5.79 times greater of excessive daytime sleepiness was found among individuals with this index above 30 kg/m^2, compared to those with BMI equal to or less than 30 kg/m^2. A study with 508 volunteers showed that the increase of 1kg/m^2 in BMI implied in chances 1.14 times greater of presenting excessive daytime sleepiness.[23] In other studies, it was observed that diabetic patients with this complaint had higher BMI than those who denied this symptom,[28] and that it proved to be associated with higher BMI in men and women, in a population-based study.[7] In another study, the increased BMI was associated with excessive daytime sleepiness in women but not in men, in which excessive daytime sleepiness was related, among other factors, to increased waist circumference.[25]

Conclusion

The scores obtained in the Epworth Sleepiness Scale were consistent with excessive daytime sleepiness in a significant proportion of patients (29.2%), observing higher scores in those who had clinical worsening and BMI greater than 30 kg/m^2, compared to those with clinical improvement and BMI equal to or less than 30 kg/m^2, respectively. The sociodemographic and clinical characteristics independently associated with excessive daytime sleepiness were the marital status 'separated', body mass index greater than 30 kg/m^2, and age of 60 years or older.

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Collaborations

Andrechuk CRS collaborated with the project design, implementation of research, article writing, critical review of the relevant intellectual content and final approval of the version to be published. Ceolim MF cooperated with the project design, analysis and interpretation of data, critical review of the relevant intellectual content and final approval of the version to be published.

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