Original article

Prevalence of insomnia and associated socio-demographic factors in a Brazilian community: the Bambuí study

Fábio Lopes Rocha[a,*], Henrique L. Guerra[b], Maria Fernanda F. Lima-Costa[b,c]

[a]*Medical Residency of Psychiatry, Institute of Social Security of the Civil Servants of Minas Gerais, Belo Horizonte, Brazil, Rua dos Otoni 106, 30150.270, Belo Horizonte, MG, Brazil*
[b]*Laboratory of Epidemiology and Medical Anthropology, René Rachou Research Center, Oswaldo Cruz Foundation, Avenue Augusto de Lima 1715, 30.190.002, Belo Horizonte, MG, Brazil*
[c]*Department of Preventive and Social Medicine – Federal University of Minas Gerais School of Medicine, Avenue Alfredo Balena 190, 30.130, Belo Horizonte, MG, Brazil*

Abstract

Background: Population-based studies of insomnia among adults residing in communities in developing countries are rare. The objectives of this population-based study were to determine the prevalence and factors associated with insomnia among adults (18 years and over) living in a Brazilian town with 15 000 inhabitants (Bambuí, MG) and to determine how the use of different definitions of insomnia affect its prevalence.

Methods: A total of 87.3% of 1221 randomly selected individuals aged 18 + participated. Prevalences were estimated based on different definitions. To determine the associated characteristics, insomnia was defined as a complaint in the last month, occurring at least three times a week, causing distress.

Results: (1) Prevalence ranged from 12.0 to 76.3%; (2) prevalence of insomnia, as defined above, was 35.4%; (3) prevalence among women increased with age and was higher than that of men; (4) insomnia was independently associated with less education in both sexes, and among females it was associated with older age (60 + years).

Conclusions: The prevalence of insomnia in Bambuí was high, similar to that of urban centers of developed countries; this investigation substantiated the importance of operational criteria in studies of insomnia. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Sleep; Initiating and maintenance of sleep disorders; Insomnia; Epidemiology

1. Introduction

Prevalence and factors associated with insomnia in communities have been largely studied in developed countries [1–11], but it is not known whether the results can be generalized to developing countries. Community-based studies on insomnia in developing countries are still rare and have been carried out only in Brazil, Mexico and Singapore [12–14]. The Brazilian study took place in the city of São Paulo (SP), which is the largest city in the country, with 9.5 million inhabitants [15]. In this investigation, 1000 inhabitants aged 20 + years were selected through a stratified random sample of which about 50% of the individuals complained of insomnia [12]. In 1995 in Mexico, Téllez López et al. [13] reported a 36.1% prevalence of insomnia (16% with severe insomnia) among 1000 volunteers aged

18–84 years from the Monterrey metropolitan area. In 1996 in Singapore, Yeo et al. [14] reported a 15% prevalence of insomnia in 2418 representative inhabitants between the ages of 15 and 55 from an area in the city of Singapore. In these studies, the factors associated with insomnia were female sex [12–14] and low social class [12], and among women, low education [13] and among men, being a student [13].

The criteria utilized in the definition of insomnia is an important factor to be considered in the interpretation of the results of community studies concerning the prevalence of insomnia. Unfortunately, however, there have been few studies done that have investigated the problem of the definition of insomnia [5,9]. Operational criteria for the definition of insomnia, which take into consideration frequency, distress and impairment in performing the following day's activities, have only recently been outlined [10].

Brazil is a very heterogeneous country, with great social inequalities (Gini's coefficient = 0.59) [15]. In addition to social differences within populations residing in the same

* Corresponding author. Tel./fax: +55-31-3241-1474.
E-mail address: rochafl@uol.com.br (F.L. Rocha).

area (region, city or town), the larger cities, in general, are economically richer than the towns, which tend to be poorer. In 1996, out of 4475 Brazilian municipalities, 72% had ≤20 000 inhabitants, in which around 27 million (19%) of the total population of the country lived [15]. The sleep problems of people living in small communities in Brazil and other developing countries are still unknown.

This paper presents the results of the first community study on insomnia carried out in a small town in Brazil. The main objectives of this investigation were to assess the prevalence of insomnia in the community and to examine the socio-demographic factors associated with it. An additional objective was to determine the effect on the prevalence of insomnia in the community as a result of adopting different criteria for the definition of insomnia.

2. Materials and methods

2.1. Study area and population

This study is part of the Bambuí health survey, which is a population-based study carried out in the town of Bambuí (around 15 000 inhabitants), which is situated in the state of Minas Gerais in Southeastern Brazil [16]. The economy of the municipality of Bambuí is based on farming and commerce. In 1991, the Human Development Index in this community was 0.70, the life expectancy was 70.2 years and the infant mortality rate was 48.4 per 1000 live births [16,17].

A complete census was carried out in the town of Bambuí between October and November of 1994 in order to determine the participants for the Bambuí health survey. A non-replaceable random sample of 1664 residents aged ≥5 years was selected for the health survey [16]. Those in the sample aged ≥18 years (n = 1221) were selected for the present study. Considering that the population of Bambuí aged ≥18 years was 10 645 inhabitants, this sample is large enough for estimating a prevalence of insomnia of 30.0% with a precision of 2.6% and a confidence interval of 95.0% [18].

2.2. Insomnia

All of the information for this study was collected through interviews that were conducted between October 1996 and January 1997 [16]. Information about insomnia was collected using a structured and codified questionnaire adapted from a previously validated one in Brazil [12]. The main modification was the inclusion of questions about disturbance due to sleep problems and impairment while performing activities the following day. These questions were introduced to improve the characterization and definition of insomnia according to operational criteria [4,6].

The questions about insomnia referred to the past 30 days. The following questions were considered: (a) frequency of difficulty in initiating sleep (DIS); (b) distress with DIS; (c) frequency of disrupted sleep (DS); (d) distress with DS; (e) frequency of early morning awakening (EMA); (f) distress with EMA; (g) impairment while performing activities the following day (due to DIS, DS and/or EMA). The questions about the frequencies of DIS, DS and EMA had the following answers: none = 0; less than once a week = 1; once or twice a week = 2; three times a week or more = 3. The questions about distress had the following answers: without distress = 0; little = 1; moderate = 2; much = 3; no complaint of insomnia = 8. The question about impairment while performing activities the following day had the following answers: no impairment = 0; little = 1; moderate = 2; much = 3; no complaint of insomnia = 8.

The reliability of the questionnaire used in this study was assessed in an outpatient clinic in the city of Belo Horizonte in Minas Gerais (around 200 km from the town of Bambuí). The reliability varied from intermediate to excellent depending on the questions (Kappa statistic ranged from 0.43 to 1.00, with the median being 0.72).

Different prevalences of insomnia were calculated based on different definitions of insomnia, which took into consideration the frequency of the complaint, level of distress and level of impairment while performing activities the following day. To determine the associated socio-demographic variables, insomnia was defined as the presence of any complaint (DIS, DS or EMA) during the last 30 days, at least three times a week or more, with any level of distress.

2.3. Socio-demographic characteristics

The exploratory variables in the present study were: sex, age (18–29, 30–44, 45–59, 60 + years), skin color – determined by comparison to reference photos (white, *mulato* or *moreno*, black), marital status (single, married or living together, separated or divorced, widowed), years of complete education (0, 1–3, 4–7, 8 +), monthly personal income (none, <1, 1.0–1.9, ≥2.0 Brazilian minimum wages), monthly family income (<2.0, 2.0–3.9, ≥4.0 Brazilian minimum wages), current employment situation (working, not working or retired), religion (catholic, other) and reported use of sleeping pills in the past 30 days (no, yes).

2.4. Data analysis

The univariate analysis was based on the Pearson χ^2-test or χ^2-test for linear trend, and on crude odds ratios [19]. The multivariate analysis was based on the odds ratios adjusted by the multiple logistic regression method [20]. The criteria for inclusion of variables in the logistic model was their association with insomnia in the univariate analysis at the <0.20 level [21]. When one or more variables were strongly correlated (such as years of education, monthly personal income and monthly family income), only that which presented the strongest association with insomnia was included in the logistic model. Because of the existence of an effect modifier of sex with age and insomnia, the multivariate analysis was performed separately for males and females. The analysis was performed using the following software: Epi-Info [18] and Stata [22].

Table 1
Prevalence of insomnia in past 30 days according to different criteria (Bambuí, 1996–1997)

Criteria			Prevalence of insomnia (%)			
Frequency	Disturbance	Impairment (daytime activities)	DIS	DS	EMA	Any
Once per week and over	Absent or present at any level	Absent or present at any level	36.6	67.5	34.2	76.3
	Light to severe	Absent or present at any level	28.5	37.8	25.5	50.7
Three times per week or more	Absent or present at any level	Absent or present at any level	20.2	44.5	18.3	51.7
	Light to severe	Absent or present at any level	18.3	27.3	14.3	35.4
	Moderate to severe	Absent or present at any level	14.8	19.2	11.4	27.0
	Light to severe	Light to severe	12.9	15.8	9.7	20.8
	Moderate to severe	Moderate to severe	8.0	8.8	6.4	12.0

3. Results

Of the 1221 selected individuals, 1066 (87.3%) participated in this study. The participants were similar to the individuals in the sample in relation to age (with a median of 39 years in both cases) and sex (45.5 and 44.3% were males, respectively).

The prevalence of complaints of insomnia in the past month ranged from 12.0 to 76.3%, based on the definition used. Insomnia characterized as the presence of any complaint (DIS, DS or EMA) during the last month, three times a week or more, with any level of distress occurred in 35.4% of the participants. DS tended to be the most frequent complaint, followed by DIS and EMA. Among those suffering from insomnia, 35.4% had at least one kind of complaint (DIS, DS or EMA), 12.3% had at least two kinds and 6.1% suffered from all three kinds (Table 1).

The distribution of insomnia according to age and sex is presented in Fig. 1. In every age group among the women, the prevalence of insomnia was higher than that of the men, and it increased with age ($P = 0.001$). Among men, the prevalence of insomnia tended to decrease at the age of 60+, however, the difference in relation to the younger groups was not significant ($P = 0.699$).

Table 2 shows the distribution of insomnia according to sex, age and skin color. Sex (females in comparison with males) and age (30–44, 45–59 and 60 + years in comparison with the 18–29 age group) were significantly associated with insomnia in the univariate analysis ($P < 0.001$), while skin color was not ($P = 0.751$).

Table 3 shows the distribution of the selected socio-demographic variables among individuals with and without insomnia. The following variables were significantly associated with insomnia in the univariate analysis: marital status ($P < 0.001$), years of education ($P < 0.001$), personal income ($P = 0.008$), family income ($P < 0.001$) and current work situation ($P < 0.001$). Religion was not associated with insomnia ($P = 0.351$).

Table 4 shows the final results of the multivariate analysis of socio-demographic factors associated with insomnia. Among males, years of education $= 1$–3 was independently associated with insomnia (OR $= 2.2$, 95% CI $= 1.1$–4.1). Among females, age group 60+ (OR $= 1.8$, 95% CI $=$

Fig. 1. Distribution of insomnia according to sex and age (Banbuí, 1996–1997).

Table 2
Univariate analysis of demographic characteristics associated with insomnia (Bambuí, 1996–1997)[a]

Characteristics	Insomnia (n)		OR (95% CI)
	Yes (377) (%)	No (689) (%)	
Sex			
Male	26.0	54.3	1.0
Female	74.0	45.7	3.4 (2.6–4.5)
P value	<0.001		
Age (years)			
18–29	22.8	33.1	1.0
30–44	32.9	32.4	1.5 (1.1–2.1)
45–59	26.5	21.8	1.8 (1.2–2.5)
60+	17.8	12.8	2.0 (1.4–3.0)
P' value	<0.001		
Skin color			
White	52.8	54.1	1.0
Mulato/moreno	44.3	43.5	1.0 (0.8–1.3)
Black	2.9	2.2	1.4 (0.6–3.0)
Not informed	0.0	0.2	–
P value	0.751		

[a] Presence of any complaint (DIS, DS or EMA) during the last 30 days, at least three times a week or more, with any level of distress. OR (95% CI), crude odds ratio (confidence interval at 95% level); P value, Pearson's χ^2; P' value, χ^2 for linear trend.
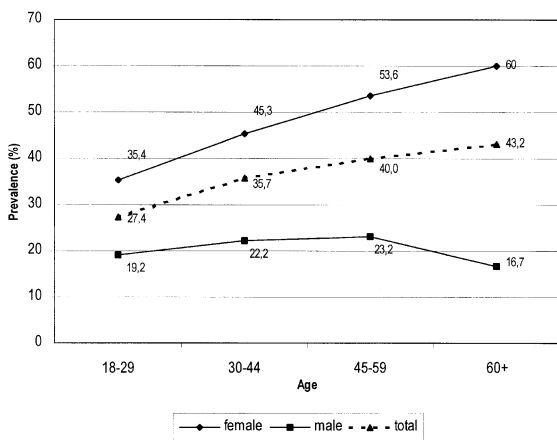
Table 3
Univariate analysis of socio-demographic characteristics associated with insomnia (Bambuí, 1996–1997)[a]

Characteristics	Yes ($n = 377$) (%)	No ($n = 689$) (%)	OR (95% CI)
Marital status			
Married/living together	58.6	59.5	1.0
Single	21.2	31.5	0.7 (0.5–0.9)
Separated/divorced	6.1	2.8	2.2 (1.2–4.2)
Widowed	14.1	6.2	2.3 (1.5–3.5)
P value	<0.001		
Years of schooling			
8+	28.4	36.0	1.0
4–7	32.6	41.1	1.0 (0.7–1.4)
1–3	25.7	15.8	2.1 (1.4–2.9)
None	13.3	7.1	2.4 (1.6–3.0)
P' value	<0.001		
Monthly personal income[b]			
≥2.0	24.9	38.0	1.0
1.0–1.9	41.4	37.0	1.7 (1.3–2.3)
<1	33.2	24.7	2.1 (1.5–2.9)
Not informed	0.5	0.3	–
P value	0.008		
Monthly family income[b]			
≥4.00	34.0	46.9	1.0
2.0–3.9	35.3	33.5	1.5 (1.1–2.0)
<2.0	29.7	18.6	2.21 (1.6–3.1)
Not informed	1.0	1.0	–
P value	<0.001		
Current employment status			
Working	51.2	66.8	1.0
Not working	41.9	26.7	2.1 (1.6–2.7)
Retired	6.9	6.5	1.4 (0.8–2.3)
P value	<0.001		
Religion			
Other	6.9	5.4	1.0
Catholic	93.1	94.3	0.7 (0.5–1.3)
Not informed	0.0	0.3	–
P value	0.351		

[a] Presence of any complaint (DIS, DS or EMA) during the last 30 days, at least three times a week or more, with any level of distress. OR (95% CI), crude odds ratio (confidence interval at 95% level); *P* value, Pearson's χ^2; P' value, χ^2 for linear trend.

[b] In Brazilian minimum wages (each = US$120.00).

1.1–3.3) and less education (OR = 1.8, 95% CI = 1.1–3.0 and OR = 2.6, 95% CI = 1.3–5.1 for 1–3 and no year of education, respectively) were independently associated with insomnia.

The use of sleeping pills during the previous 30 days was reported by 14.6% (156/1066) of the participants. This use was higher among those who complained of insomnia in comparison with those who did not (25.2 vs. 8.8%, OR = 3.5, 95% CI = 2.4–4.9).

4. Discussion

Insomnia, characterized as the presence of any complaint (DIS, DS or EMA) during the last month, three times a week or more, with any level of distress, occurred in 35.4% of the population studied. This prevalence was similar to the median estimated in 1991 by Weyerer and Dilling [7] (35.2%), which was based on studies carried out in the USA, Europe and Australia. In 1988 in Brazil, Giglio [12] found a 50.0% prevalence of complaints of insomnia in the city of São Paulo using a frequency of complaints of at least once a week. This result is quite similar to the prevalence found in the present study when considering insomnia as the presence of a sleeping complaint in the last month, at least once a week, with distress at any level (50.7%). The prevalence of insomnia in this study is similar to that found in Monterrey (Mexico), where a 36.1% prevalence of insomnia of any kind (DIS, DS or EMA) was reported [13]. These rates were higher than those reported in the other study

Table 4
Final results of the multivariate analysis of socio-demographic factors associated with insomnia, according to sex (Bambuí, 1996–1997)[a]

Characteristics	OR (95% CI)	
	Males	Females
Age group (years)		
18–29	1.0	1.0
30–33	1.1 (0.6–2.0)	1.4 (0.9–2.2)
45–59	1.0 (0.5–1.9)	1.5 (0.9–2.6)
60+	0.6 (0.3–1.5)	1.8 (1.1–3.3)
Years of schooling		
8+	1.0	1.0
4–7	0.7 (0.4–1.2)	1.3 (0.8–2.0)
1–3	2.2 (1.1–4.1)	1.8 (1.1–3.0)
None	1.4 (0.5–3.6)	2.6 (1.3–5.1)

[a] Presence of any complaint (DIS, DS or EMA) during the last 30 days, at least three times a week or more, with any level of distress. OR (95% CI), odds ratio and 95% confidence interval adjusted by multiple logistic regression for the variables listed in the table (1055 individuals participated in the final analysis: 472 males and 594 females).

which was carried out in Singapore (Singapore) in which a 15.3% prevalence of insomnia was reported [14].

A significant result of this investigation is that the prevalence of insomnia in the studied community varied from 12.0 to 76.3% depending on the definition used. In 1988, Liljenberg et al. [5], in a study carried out in two rural areas in Sweden, showed that dropping one of the criteria for the definition of insomnia, namely diurnal somnolence, caused the prevalence of insomnia to increase threefold. Analogous results were found by Ohayon [10] in 1997 in France. A total of 18.6% of the sample reported insomnia complaints. Insomnia complaints, lasting for at least 1 month with daytime repercussions, were found in 12.7% of the sample. DSM-IV specific sleep disorders were given for 5.6% of the sample. The diagnosis of primary insomnia was given for 1.3% of the sample. Our results show that the definition of insomnia used is an important factor for the proper assessment of its prevalence. In addition, they confirm the importance of the criteria used for a proper comparison of the results of different studies.

In the present study, DS was the most frequent complaint, followed by DIS and EMA. DS along with DIS are the kinds of insomnia most frequently reported in community studies [1,2,5,8,11,12].

The socio-demographic factors associated with insomnia in this study were: female sex, age and less education. Less education was more strongly associated with insomnia among females than among males. Most studies show a higher prevalence of insomnia among women [3,4,6,7,9,10, 12] and among individuals with lower socio-economic status (less education and/or low income). A higher prevalence of insomnia among individuals with a low socio-economic status [2,6,10,12] could be related to higher prevalence of physical [23] and mental health problems [2].

In the present study, insomnia was higher among females aged 60+, but not among males. To our knowledge, this difference has not been previously reported in population-based studies [1,7–9]. As a matter of interest, it was found that in the studied population the age–sex distribution for the prevalence of depression, high blood pressure and high cholesterol levels was similar to that for the prevalence of insomnia (M.F.F. Lima e Costa, pers. commun.; C.M.R. Vorcaro, pers. commun.). This suggests the hypothesis of survival bias. Substantiating this hypothesis, in a community study of elderly people in 1990, Pollak et al. [24] asserted that insomnia was a strong predictor of both mortality and nursing home placement in males, whereas for females, insomnia was only a borderline predictor of mortality.

Several studies reported an increased frequency of insomnia among widowed, separated and divorced people [1,6,8–10]. In the current study, the association between insomnia and marital status disappeared after adjustments for confounding variables. The same occurred with regards to the current employment situation. Skin color and religion were not associated with insomnia.

In the studied community, the report of using sleeping pills in the last month was quite high (15% of the population) compared to that in São Paulo (9%, present use) [12], France (10%, present use) [8,10] or the United States (2.6%, use of hypnotics in the last year) [4]. Of the 156 people interviewed that reported using sleeping pills, around 60% had sleep complaints. This may indicate that their treatment needs to be reassessed.

Concerning aspects of methodology, every effort was made to avoid bias in this study by encouraging participation (which ensures internal validity), random selection of participants, standardization of procedures and instruments, assessment of the reliability of questionnaires and careful training of field staff, among other precautions [16]. With respect to the internal validity of the study, the number of losses was low (12.7%) and within the estimate of the sample calculation. In addition, the participants were similar to those of the sample with respect to age and sex. The insomnia questionnaire was adapted from an instrument previously validated and utilized in Brazil and the adapted version used in this work presented good median reliability. In addition, the questions about insomnia were restricted to the last month to avoid recall bias.

In summary, we conclude that insomnia is an important problem, with high prevalence, even in a small community of a developing country. This means that the burden of insomnia in this small town seems to be as high as that observed in developed countries. Even in this economically poor town, social differences (represented by a low level of education) were important to explain the distribution of insomnia. Further investigations are necessary to identify the reasons for the differences in the distribution of insomnia between men and women according to age. It is necessary to verify if these results are replicated in others towns of Brazil as well as in other developing countries.

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