JCSM
Journal of Clinical Sleep Medicine

SCIENTIFIC INVESTIGATIONS

Sleep Complaints in the Adult Brazilian Population: A National Survey Based on Screening Questions

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Study Objectives: The aim of the current survey was to investigate the prevalence of sleep complaints in a randomized cluster sample of the Brazilian population.

Methods: A 3-stage cluster sampling technique was utilized to randomly select Brazilian subjects older than 16 years, of both genders and all socioeconomic classes. The final sample of 2,110 subjects from 150 different cities was enough to estimate prevalence in the Brazilian population with a sampling error of ± 2%. Questions about sleep complaints were administered face-to-face by Instituto Datafolha interviewers on March 26 and 27, 2008. Data were expanded using a weighted variable.

Results: Of all interviewed subjects, 63% reported at least one sleep related complaint. Sleep complaint prevalence increased with age and was similar among inhabitants of different Brazilian regions, as well as between metropolitan areas and smaller cities. Insomnia and nightmares were significantly more prevalent in women (40% and 25%, respectively), and snoring was more prevalent in men (35%). For sleep complaints with frequencies greater than 3 times per week, we found the following prevalence: 61% for snoring, 35% for insomnia, 17% for nightmares, 53% for leg kicking, and 37% for breathing pauses.

Conclusions: Because sleep disorders are affect a high proportion of the population and are known to be correlated with decreased well-being and productivity, more detailed national surveys are necessary to provide relevant information to develop approaches to prevention and treatment.

Keywords: Sleep, sleep complaints, epidemiology, Brazilian survey, gender

Citation: Bittencourt LRA; Santos-Silva R; Taddei JA; Andersen ML; de Mello MT; Tufik S. Sleep complaints in the adult brazilian population: a national survey based on screening questions. *J Clin Sleep Med 2009*;5(5):459-463.

In the last 4 decades, scientific interest in sleep patterns has grown steadily. Population based studies have shown that sleep disorders are prevalent[1,2] and highly associated with diurnal sleepiness,[3,4] neurocognitive alterations,[5,6] cardiovascular diseases,[7] and increased risk for accidents.[8-11] The findings of epidemiologic studies are not only applicable in clinical practice but also in the planning and implementation of public policy and programs aimed at controlling sleep disorders and mitigating their impact on individuals and societies.

Sleep disorder surveys that have been carried out in different Brazilian cities suggest that both small and big cities have similar prevalence of sleep complaints.[12-14] However, Brazil is a very large country, and there is considerable ethnic, cultural, and social diversity among different population groups.[15,16] One multicenter survey assessed residents of São Paulo, Buenos Aires, and Mexico City, assumed that sleep patterns in these 3 metropolises would be sufficiently similar to allow for joint analyses.[17] However, different sampling and data gathering methodologies were applied in each city, which invalidated any attempt to compare sleep patterns and prevalence of sleep disturbances. In 2002, a large scale survey was conducted in several countries, including Brazil, with the aim of raising public awareness of the importance of sleep for health, productivity, and safety.[18] In that worldwide investigation, Brazil figured as the country with the highest prevalence of symptoms associated with sleep disturbances. However, the study also failed to adhere to a homogeneous sampling pattern, which could have adversely affected the results.

Despite the fact that some studies have described the prevalence of sleep complaints in Brazilian sub-populations, none have been comprehensive enough to provide reliable national profiles. The aim of the current survey was to investigate the prevalence of sleep complaints in a randomized cluster sample of the Brazilian urban population.

METHODS

The sample was drawn based on data from the 2000 Brazilian census and its population growth projection for 2007 (125,614,467 inhabitants) (www.ibge.gov.br). A 3-stage cluster sampling technique was used.[19] In the first stage, Federal Units were proportionally stratified by population and city sizes. Cities and research points were then selected randomly.

Submitted for publication December, 2008
Submitted in final revised form April, 2009
Accepted for publication April, 2009
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	P1	P2					
	Yes	3 or more times a week	1 to 2 times a week	2 to 3 times a month	Once a month	Less than once a month	Others. Which one?
a. Snoring	1	1	2	3	4	5	98
b. Breathing pauses	2	1	2	3	4	5	98
c. Insomnia	3	1	2	3	4	5	98
d. Kicking legs	4	1	2	3	4	5	98
e. Nightmares	5	1	2	3	4	5	98
f. Others. Which one? _____	98	1	2	3	4	5	98
g. He (she) has not sleep problems	96						

Figure 1—Questions about sleep complaints asked of all subjects. P1. Do you have any of the following problems during sleep? Do you have other problems during sleep that are not presented on this card? P2. How frequent is the _____ problem?

Subjects older than 16 years of age, representing both genders and all socioeconomic classes (www.abep.org/codigosguias/ABEP_CCEB.pdf) were proportionally included. The final sample size of 2,110 subjects, from 150 different cities, was sufficient to estimate Brazilian population characteristics with a sampling error of ± 2%. For 0.5% or lower estimates, zero was assumed. Frequencies lower than 30 were not sufficient for statistical analyses. Screening questions about sleep complaints were administered in face-to-face sessions by Instituto Datafolha interviewers for all selected subjects on March 26 and 27, 2008. Questions were asked about snoring, breathing pauses, insomnia, kicking legs, nightmares, or others complaints; answers were categorized in frequencies of ≥ 3 times a week, 1 to 2 times a week, 2 to 3 times a month, once a month, and less than once a month (Figure 1).

The data were expanded using a weighted variable based on population profiles of the four macroeconomic country regions (Center-West and North regions 15%, Northeast 28%, Southeast 42%, and South 15%) and of small cities and metropolitan areas (60% and 40%, respectively), to obtain proportions for the Brazilian population stratified by sex, age group, marital status, presence of children in the family, years of schooling, and socioeconomic class. To assess statistical significance among the proportions, a weighted χ^2 test was used; significance level was set at ≤ 0.05. Analysis was performed by the SPSS statistical software package (version 14.0 for Windows).

RESULTS

The 2,110 subjects had a mean age of 38 years (SD 16) and were proportionally distributed throughout the Brazilian regions: 15% from the South, 42% from the Southeast, 28% from the Northeast, and 15% from the less populated Center-West and North regions. Forty percent of the subjects were from metropolitan areas and 60% from smaller cities. Sample demographic characteristics are presented in Table 1.

As shown in Table 2, at least one sleep related complaint was reported by 63% of subjects. The frequency of sleep complaints was similar among Brazilian regions, and between large metropolitan areas and smaller cities. Such proportions varied from 61% to 64% ($p > 0.05$). Sleep complaints significantly increased with age ($p < 0.05$), and 71% of subjects older than 45 years reported at least one sleep disorder. Insomnia and nightmares were significantly more prevalent in women than men (40% vs. 25% and 25% vs. 19%, respectively; $p < 0.05$), and snoring was more prevalent in men than women (35% vs. 23%; $p < 0.05$). Among the group that reported sleep complaints, the percentage of frequencies > 3 times per week were: 61% for snoring, 35% for insomnia, 17% for nightmares, 53% for leg kicking, and 37% for breathing pauses.

It was also found that, on average, each subject complained of 1.6 sleep disorders. Subjects with insomnia complaints showed significantly increased complaints of leg kicking (53%), breathing pauses (50%), and nightmares (48%). Subjects with snoring complaints also showed significantly increased complaints of breathing pauses (59%) and leg kicking (41%).

Table 1—Demographic Characteristics of Subjects (n = 2,110). Percentages (95% CI) were Expanded Using a Weighted Variable

Variables	% (95% CI)	n
Gender		
Male	49 (45.9–52.0)	1028
Female	51 (47.9–54.0)	1082
Age, years		
16 to 24	25 (21.3–28.7)	524
25 to 34	24 (20.3–27.7)	499
35 to 44	19 (14.8–23.2)	405
45 to 59	19 (16.2–22.8)	407
60 or more	13 (9.1–16.9)	275
Marital status		
Single	39 (35.7–42.3)	823
Married	45 (41.8–48.1)	948
Divorced or separated	9 (5.0–12.9)	195
Widow	7 (2.8–11.2)	138
no answer	0.3	6
Presence of children		
families with children	66 (63.4–68.6)	1393
Years of schooling		
≤ 8	49 (45.9–52.0)	1023
8 to 12	40 (36.7–43.3)	848
> 12	11 (7.1–14.9)	239
Family monthly income		
Up to R$2,075 (~US$1,000)	81 (79.5–82.5)	1697
Socioeconomic classes (CCE)		
Upper (A+B)	24(20.3–27.7)	511
Middle (C)	54 (51.1–56.9)	1128
Lower (D+E)	22 (18.3–25.7)	471

CCE = Brazilian Economical Classification Criteria (www.abep.org/codigosguias/ABEP_CCEB.pdf)

DISCUSSION

National surveys with questions of interest included in long questionnaires administered in public places by non-specialized interviewers have strengths and shortcomings for the study of sleep epidemiology. The advantages are related to the opportunity to generate specific low-cost information on sleep patterns for a country or region that is relevant for the planning of prevention activities in various sectors of society such as the health, education, transport, and industrial sectors.[20] The shortcomings are due to the fact that such information cannot be sufficiently precise and complete for the study of small sub-populations with specific characteristics in terms of lifestyle and/or ethnicity.

The results of the present study showed a high prevalence of sleep disorder complaints in the Brazilian general population,

Table 2—Presence of Sleep Complaints in the Brazilian Population Sample (n = 2,110). Percentages (95% CI) were Expanded Using a Weighted Variable

	Any sleep complaint	Insomnia	Snoring	Nightmares	Kicking legs	Breathing pauses	Others†	No answer	n
Total	63 (61.0-64.9)	33 (31.0-34.9)	29 (27.1-30.9)	22 (20.2-23.8)	12 (10.6-13.4)	6 (5.0-7.0)	0	1 (0.6–1.4)	2110
Male	60 (57.0– 62.9)	25 (22.4–27.6)	35 (32.1–37.9)#	19 (16.6–21.4)	12 (10.1–13.9)	5 (3.7–6.3)	0	0	1028
Female	65 (62.2–67.8)	40 (37.1–42.9)#	23 (21.5–25.5)	25 (22.5–27.5)	13 (11.0–14.9)	7 (5.5–8.5)	1 (0.4–1.6)	1 (0.4–1.6)	1082
16 to 24 yrs	54 (49.8–58.3)	23 (19.4–26.6)	13 (10.2–15.8)	25 (21.3–28.7)	15 (12.1–17.9)	5 (3.1–6.9)	1 (0.1–1.8)	1 (0.1–1.8)	524
25 to 34 yrs	59 (54.6–63.4)	31 (26.9–35.0)	25 (21.2–28.8)	21 (17.4–24.6)	11 (8.3–13.7)	4 (2.3–5.7)	0	-	499
35 to 44 yrs	63 (58.4–67.5)	35 (30.4–39.6)	31 (26.5–35.5)	20 (16.1–23.9)	10 (7.1–12.9)	5 (2.9–7.1)	1 (0.1–1.9)	0	405
45 to 59 yrs	71 (67.0–74.9)*	39 (34.1–43.7)	43 (38.2–47.8)*	22 (18.0–26.0)	14 (10.7–17.3)	7 (4.6-9.4)	0	0	407
> 60 yrs	72 (67.1–76.9)*	42 (36.2–47.8)	41 (35.2–46.9)*	20 (15.3–24.7)	11 (7.3–14.7)	-	-	2 (0.3–3.6)	275

† = Others included sleeptalking and bruxism; * = $p < 0.05$ compared with age groups younger than 45 y; # = $p < 0.05$ compared with the other gender.

affecting approximately 79.2 million people, and are similar in all Brazilian regions. Insomnia was the most prevalent complaint, reported by 33% of Brazilian population. As shown in most studies,[21] sleep disorders increase with age, and show high prevalence even among the middle-aged group, which is the most productive group in modern society. The consequences of such disorders affect social, human, and economic development.

The prevalence of insomnia found in our study is in line with others studies that have reported prevalence estimates from 10% to 48%.[22] However, estimates of the prevalence of insomnia can be affected by a number of factors such as the characteristics of the population sampled, the definition of insomnia, regional perceptions, and management practices regarding sleep disorders. One population-based study,[13] carried out in Bambuí, Brazil, showed that the prevalence of insomnia ranged from 12% to 76% depending on which definition was used. Consistent with previous studies,[14,23,24] we found that women reported more insomnia (40%) than men (25%). A recent review of the literature covering more than 50 studies of insomnia suggested that women are twice as likely as men to have a diagnosis of insomnia.[22] That study speculated that menopause is often offered as an explanation for the discrepancy between genders in the prevalence of insomnia in middle-aged subjects. Insomnia among women is related to genetic background, hormone level variations, and mood instability. When we look at the frequency of insomnia, more than one-third of the subjects reported that it was more frequent than three times per week, in accordance with other studies.[22]

Snoring was the second most frequently reported sleep complaint in our study (29%) and was significantly elevated in subjects older than 45 years (43%). As previously described in the literature,[25] our data showed that men (35%) reported snoring significantly more than women (23%). A recent cross-sectional study[26] evaluating a representative sample comprising 3,136 adults (≥ 20 years old) living in the city of Pelotas, Brazil, showed that after adjustment the risk of habitual snoring was greater in men (prevalence ratio [PR] = 1.25, 95% CI: 1.16 to 1.34) than women. Previous population surveys found several factors predicting snoring besides age and gender, large neck size, obesity, smoking, and alcohol consumption.[25,27] Interestingly, reports of breathing pauses (a sign of sleep disordered breathing, usually associated with snoring), were not prevalent in our study. This could be explained by the fact that breathing pauses during sleep are mostly reported by bed partners[28] and our questionnaire was administered face-to-face to subjects at public research points.

Nightmares were reported by 22% of the subjects, with marginally higher frequencies in women than men (25% vs. 19%, respectively). Our results are in line with others community-based studies that indicate 8% to 29% of adults report nightmares monthly.[29,30] Pires and coworkers,[14] in a study comparing sleep complaints among adults from Sao Paulo (Brazil) in two consecutive decades (1980s and 1990s), showed that reports of nightmares were 11% and 8.5%, respectively, and were slightly more prevalent in women. A meta-analysis of gender differences in dream recall indicated that there is a small but significant gender difference, i.e., women tend to recall their dreams more often than men.[31]

Of all subjects evaluated, 12% reported leg kicking during sleep, which can be associated with specific sleep disorders. The prevalence of periodic leg movements during sleep (PLMS) is estimated to be 4% to 11% in adults and increases with age.[32] In a study investigating the prevalence of PLMS in a randomly selected elderly sample, 45% presented a PLMS index ≥ 5 per hour of sleep and correlates of PLMS included reports of kicking at night.[33] Nevertheless, our data did not show that reports of leg kicking increased with age. Restless legs syndrome (RLS) is characterized by the following four diagnostic criteria: an urge to move that is usually associated with abnormal sensations in the legs, and symptoms that are engendered or worsened by rest, relieved by movement, and most severe at night, negatively affecting sleep. RLS prevalence ranges from 5% to 10% and usually occurs together with PLMS. Patients or bed partners may complaint of kicking or arm movements at night.[34]

Our results showed that each subject reported, on average, almost two concomitant sleep complains. As expected, snoring was significantly associated with breathing pauses and leg kicking. On the other hand, insomnia was associated with leg kicking, breathing pauses, and nightmares. It has been hypothesized that the sleep disruption caused by sleep disordered breathing (SDB) may cause or contribute to chronic insomnia complaints. Early studies designed to address the use of polysomnography (PSG) in the diagnosis of insomnia suggested that 3% to 10% of insomnia cases might be attributed to SDB.[35] These studies did not prove a causal relationship, and it has been argued that a similar prevalence of asymptomatic SDB is found in the general population. However, two recent studies that looked at very specific cohorts of patients with insomnia found 83% and 91% prevalence of mild SDB, including upper airway resistance syndrome.[36,37] One study

reported that 50% of patients with SDB seen in a sleep clinic were found to have clinically meaningful insomnia complaints.[38] These strikingly high percentages suggest that there may be a significant population with coexisting insomnia and SDB.

The occurrence of PLMS in otherwise unexplained insomnia cases was reported to be 17% for insomniac patients.[39] Nightmares were reported by 18.3% of an insomniac population and were twice as high in women as in men.[40] Another epidemiological study showed that symptoms of gastroesophageal reflux were significantly associated with nightmares (OR = 4.4).[29]

These results are a contribution to the growing concern related to sleep disorders and their consequences in modern society. Since sleep disorders are related to decreases in well-being, productivity, intellectual capacity, as well as being associated with chronic diseases and affecting a high proportion of the population, more detailed and complete national surveys that could offer relevant information for the planning and development of preventive and curative activities are necessary. Nevertheless, the available evidence of the effects of sleep disorders on human life is sufficient to recommend more effective and comprehensive interventions.

ACKNOWLEDGMENTS

We would like to thank the Associação Fundo de Incentivo à Psicofarmacologia – AFIP and the Instituto Datafolha for their support in the current study. LRAB, MLA, MTM, and ST are recipients from fellowship from CNPq.

DISCLOSURE STATEMENT

This was not an industry supported study. The authors have indicated no financial conflicts of interest.

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