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Prevalence of sleep complaints in Colombia at different altitudes ☆, ☆☆, ★

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ABSTRACT

Study objectives: To determine the prevalence of sleep complaints in adults in Colombia at different altitudes.
Design: Cross-sectional, population-based and observational study.
Setting: Urban areas in three cities (Bogotá, Bucaramanga, Santa Marta) located between 15 and 2640 masl. Subjects Over 18 years old.
Interventions: Epworth sleepiness scale (ESS), Pittsburgh sleep quality index (PSQI), Berlin questionnaire, STOP-Bang questionnaire and diagnostic criteria for restless leg syndrome (IRLSSG).
Measurements and results: The overall prevalence of sleep complaints was 59.6% (CI 95%: 57.3; 61.8%). According to the Pittsburgh scale, 45.3% (CI 95%: 43.0; 47.5) required medical assistance. The Berlin questionnaire indicated that 19.0% (CI 95%: 17.3; 20.8%) had a high risk of sleep apnea (OSA) compared to 26.9% (CI 95%: 24.9; 29.0%) according to STOP-Bang. Among the subjects, 13.7% (CI 95%: 12.3; 15.3%) had excessive daytime sleepiness and 37.7% (CI 95%: 35.5; 39.8%) had a restless leg syndrome. When comparing cities, significant differences in the overall frequency of subjects requiring care were found between Santa Marta (higher frequency) and the other two cities. Differences in sleep problem frequency (Pittsburgh) were observed between Bogota (higher frequency) and Bucaramanga and also between Santa Marta (higher frequency) and the other two cities. The high risk of OSA (STOP-Bang) was different between Bogota (higher frequency) and Bucaramanga and also between Santa Marta (high frequency) and Bucaramanga.
Conclusions: We observed a high prevalence of sleep complaints with significant differences among the cities, indicating a need to pay a greater attention to these problems.

1. Introduction

Social and urban developments have resulted in unhealthy lifestyles. Sleep habits have changed significantly, and altered habits can cause sleep disorders [1].

The prevalence of sleep problems is 56% in the US population, 31% in Western Europe, and 23% in Japan [2]. Insomnia is the most common sleep disorder, followed by respiratory sleep disorders and restless legs syndrome [1].

Altitude has been shown to increase central apneas even in healthy people and to be associated with higher apnea-hypopnea index in those with obstructive sleep apnea [3,4] Even more, in

those with obstructive apnea, some of the episodes convert to central [5].

Due to Colombia's rugged geography, it is important to understand the impact of various disorders at different altitudes. The aim of this study was to establish the prevalence of sleep complaints in adults in three Colombian cities located between 15 and 2640 meters above sea level.

This study is part of the project *"Prevalence and Diagnostic Tests of Sleep Disorders, and their Relationship to Cardiovascular Risk in Colombia at Different Altitudes."*

2. Materials and methods

2.1. Study Design

A cross-sectional population study was conducted in three Colombian cities (Santa Marta, Bucaramanga, and Bogota) located at 15, 959, and 2640 meters above sea level, respectively. The target population was adults aged 18 and over, living in urban areas. Subjects with mental disorders were excluded and replaced using the same sampling technique. The protocol was approved by the Research Ethics Committee of the Pontificia Universidad Javeriana in Bogota.

2.2. Sampling

We performed a community-based strategy to select subjects, and independent samples were taken in the three cities. The pollster toured the building clockwise, recording the number of homes. Later, the pollster attempted to communicate with the adults in those homes. In the event that eligible subjects were not found in a building, the pollster counted the homes of the adjacent buildings. The questionnaires were applied by interviewers in person.

2.3. Sample size

Sample size was calculated considering the adult population of interest. The Levy and Lemeshow formula was used for the calculation [6] based on the following parameters: a population estimated between 18 and 90 years of age for the three cities (with a combined population of 5,200,000 adults) with an overall estimated prevalence of 6.5% in Colombia, an estimate accuracy of 10% and a type I error of 5%; the sample size was calculated as 5600 people. This sample was taken as follows: 1867 in Bogota, 1867 in Bucaramanga, and 1866 in Santa Marta.

2.4. Measuring instruments

Data were collected between February and July 2013. Participants answered a 40-item questionnaire that included contact information, demographic data, the Epworth Sleepiness Scale (ESS), the Pittsburgh Sleep Quality Index (PSQI), the Berlin questionnaire, the STOP-Bang questionnaire and questions related to diagnostic criteria for restless legs syndrome proposed by the International Restless Legs Syndrome Study Group (IRLSSG).

The ESS [7] is designed to measure the propensity for daytime sleep or EDS, and was validated in Colombia by Chica et al. [8].

The PSQI in the Colombian validation (PSQI-CV) is a questionnaire that assesses sleep quality and classifies people as "good or poor sleepers." [9].

The Berlin questionnaire explores three categories related to the risk of sleep apnea. It was validated in Colombia by Polanía et al. [10].

The STOP-Bang questionnaire for sleep apnea was developed to assess the likelihood of OSA in the surgical field and has been validated in the general population [11].

Diagnostic criteria for RLS proposed by the IRLSSG were taken into account; and subjects were considered as positive if at least two positive criteria out of four were found [12].

2.5. Statistical analysis

The analysis included the overall prevalence of sleep disturbances by city and sex. Weighted means or percentages were used, according to the expansion factors established under the selection probabilities considered for the study design, along with an adjustment for population distribution by city, age, and sex based on population projections for the 2012 census. Additionally, confidence intervals were estimated at 95%. STATA (13.0) (StataCorp; College Station, TX) was used for the statistical analyses.

3. Results

The number of subjects surveyed was 5474 (32.6% in Bogota, 33.1% in Bucaramanga, and 34.3% in Santa Marta). The compliance level of the selected sample was greater than 95% in each city (overall, 97.3%). The percentage of missing data was 4.1%.

Most of subjects were female (53.8%) between 18 and 44 years of age (66.1%) (Table 1). The weighted average age of the population was 40.1 years.

Only 41.5% had a body mass index (BMI) in the normal weight category, and women had a higher prevalence of obesity (17.3 versus 11.1%) (Fig. 1). Additionally, women required more sleep medication and had worse sleep quality. Distribution by sex and age groups was similar for the three cities.

The subjects had regular sleep schedules (93.5%), with an average duration of 7.9 $\pm$ 3.1 h of sleep. With respect to sleep habits, went to bed early and got up early (38.4%) than those who stayed up late and got up late (18.2%) (Table 2).

The population had good sleep quality (68.8%); however, it was found that approximately 45.0% of subjects snore. However, most of the snorers did not know whether they stop breathing during sleep (53.3%).

For those over 65 years of age, it was found that 58.8% slept more than eight hours; however, this group also had the highest use of sleep medications. The overall prevalence of sleep complaints was 59.6% (95% CI: 57.3; 61.8%).

According to the Pittsburgh scale, 45.3% (95% CI: 43.0, 47.5%) of the population requires medical care due to sleep problems

Table 1
Sociodemographic data by place of residence, qualitative variables (n=5474).

Variable	Bogota		Bucaramanga		Santamarta	
	%*	CI 95%	%*	CI 95%	%*	CI 95%
Age groups						
18–44	66.08	(63.69; 68.38)	64.67	(62.45; 66.83)	68.17	(65.89; 70.37)
45–65	26.55	(24.42; 28.79)	25.74	(23.86; 27.71)	24.52	(22.53; 26.63)
>65	7.38	(6.24; 8.69)	9.59	(8.26; 11.11)	7.31	(6.12; 8.71)
Sex						
Masculine	46.27	(43.67, 480.89)	45.05	(42.66, 470.47)	46.34	(43.89, 480.81)
Femenine	53.73	(51.11, 560.33)	54.95	(52.53, 570.34)	53.66	(51.19, 560.11)

%*: Weighted percent by expansion factors 95% CI: 95% confidence interval.