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Sleep Quality and Sleep Problems in Mexican Americans Aged 75 and Older Running Head: Sleep quality and sleep problems in Mexican-American elders

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Abstract

Background/Aims—Sleep complaints and poor sleep quality are common in the elderly population. The aim of this study was to determine factors associated with sleep complaints and poor sleep quality among older Mexican Americans over a **3-year** period.

Methods—1085 non-institutionalized Mexican American aged 75 years and older. Sociodemographic characteristics, medical conditions, depressive symptoms, disability cognitive impairment, body mass index, sleep problems (trouble falling asleep, waking up several times per night, trouble staying asleep and awaking not rested) and overall sleep quality were obtained.

Results—Of 1085 participants, 12.6% reported trouble falling asleep, 30% waking up several times per night, 11.4 % trouble staying asleep, 9.4% awaking not rested and 16.6% poor sleep quality. Depressive symptoms and heart attack predicted trouble falling asleep; diabetes, cancer and obesity predicted waking up several times per night; diabetes, hypertension, cancer and depressive symptoms predicted both trouble staying asleep and awaking not rested. Being female, married, heart attack and depressive symptoms were associated with poor quality sleep.

Conclusions—Different risk factors were associated with different aspects of sleep complaints. Since poor sleep has been linked to poor outcomes, a good understanding of these factors may help in designing interventions to improve sleep quality in this population.

Keywords

Sleep; Quality; Older Adults; Mexican Americans

INTRODUCTION

Sleep complaints and poor sleep quality are common in the elderly population. Many factors can contribute to poor sleep quality as people grow older: death of a spouse, retirement, depression, chronic pain, physical and mental health conditions, nocturia, and medication

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side effects, among others (1, 2). Poor sleep quality can be associated with an increased risk of falls, memory problems, chronic fatigue, frailty, institutionalization and mortality (1-4).

Sleep quality is difficult to measure in community-based studies because of the challenge of using objective sleep instruments like polysomnograms to assess sleep complaints in a large population. Thus, past community-based studies have relied on self-reported questionnaires to measure sleep complaints. These questionnaires have been validated and have become widely used tools in sleep-related quality of life studies (5-8). The most common questions asked in these questionnaires relate to: trouble falling asleep, waking up during the night, waking up too early and not being able to fall asleep again and daytime sleepiness or frequent day naps (7-9).

In a community-based study of approximately 9000 white and African American adults aged 65 years and older from the Established Populations for Epidemiologic Studies of the Elderly (EPESE), the prevalence of insomnia ranged 28-40% (8). Differences in prevalence of sleep complaints varied by race and gender (8, 10, 11). In a study of approximately 4000 community-dwelling elders aged 65 and older, African Americans reported fewer sleep complaints than older Non-Hispanic White Americans (9). This racial difference persisted after adjusting for sex, age, poor cognition, lower education, comorbidities, depression and self-rated health (9). Foley et al. (10) using data from the Duke EPESE cohort study, showed that older African-American women had higher prevalence of insomnia (19%) than their male counterparts (12%), but no gender differences were seen among Non-Hispanic White elders (14%). Information from several studies supports the concept of sleep complaints and sleep problems are more frequent in certain racial groups (9, 12-14). This fact likely reflects both cultural and epidemiological factors since the incidence of insomnia in healthy elderly individuals is similar to that of other age groups. Racial and ethnic differences in sleep complaints could reflect the known racial variation in prevalence of risk factors (e.g., obesity, diabetes) associated with sleep complaints (15-17).

Mexican Americans, a fast growing segment of the US elderly population, comprise the majority of US Hispanics. Yet little is known about patterns and correlates of sleep problems in this population. Most studies of predictors of sleep problems have been conducted in the non-Hispanic white population. It is not clear whether we can generalize those sleep findings to Hispanics.

Why would prevalence and predictors of sleep problems in Mexican American Hispanics be different from findings reported in Whites? First, preliminary evidence suggest ethnic differences in cultural correlates of sleep (e.g., afternoon naps), in sleep architecture and in environmental determinants of sleep quality (e.g., number of sleepers per room, proximity of room to noise, inner city living) (18, 19). For example, data from the 1990 National Health Interview Survey showed that non-white ethnicity (blacks and Hispanics) predicted increased likelihood of having shorter sleep duration, a finding explained in part by inner city residence (20). These differences suggest that findings on prevalence and predictors of sleep problems derived from a non-Hispanic white population may not be readily generalizable to an Hispanic population. Second, the high prevalence of sleep-related risk factors (e.g., obesity, diabetes and alcohol use) in the Hispanic population could possibly lead to a high prevalence of sleep problems in this population (12-17). Preliminary evidence supported this possibility. Cross-sectional data from the Sleep Heart Health Study showed that older Hispanic men had a significantly higher risk of frequent snoring than non-Hispanic white men (21). This finding was independent of BMI and other potential confounding variables. By contrast, White, Black, American Indian and Asian men showed no significant difference in rates of snoring (21).

Finally, coexisting sleep problems (e.g., sleep apnea or sleep duration of 5 h or less) could also impact the optimal management of diabetes, obesity and other sleep-related conditions (22). Recent findings suggest a significant relationship between chronic sleep loss and increased incidence of diabetes and obesity (19, 22). Understanding the bidirectional relationship between these conditions and sleep problems in different ethnic populations may help in developing culturally appropriate interventions to improve sleeps problems by improving the management of sleep-related risk factors. The purpose of this study was to determine the factors associated with sleep complaints and poor sleep quality among older Mexican Americans over a 3- year period.

METHODS

Sample and procedures

Data are from the original cohort surveyed in 1993–1994 and the new cohort surveyed in 2004–2005 of the Hispanic Established Population for the Epidemiologic Study of the Elderly (HEPESE), an ongoing community-based study of noninstitutionalized older Mexican Americans residing in five southwestern states (Texas, California, Arizona, Colorado and New Mexico). The original HEPESE cohort included 3050 Mexican Americans aged 65 years and older. This cohort was selected through multistage area probability sampling of selected counties, blocks and households. The sampling procedure assured a sample generalizable to approximately 500,000 older Mexican Americans living in the southwest (23, 24). In 2004-2005, 1167 participants from the original cohort aged 75 and older were re-interviewed. A new sub-sample of 902 respondents aged 75 years and older was added in 2004-2005, using sampling procedures similar to those used in 1993–1994. Both cohorts received identical evaluations at baseline and follow-up (sociodemographics, health conditions, psychosocial characteristics, blood pressure, anthropometric measures and physical function measures). Six waves of data have been collected (1993-1994, 1995-1996, 1998-1999, 2000-2001, 2004-2005 and 2007-2008). In-home interviews were conducted in Spanish or English based on the respondent's preference.

The present study used data from the fifth (2004-2005) and sixth (2007-2008) wave of the original cohort and baseline (2004-2005) and follow-up (2007-2008) from the new cohort. Of 2069 participants interviewed in 2005-2006, 984 were excluded (362 had missing data on covariates or sleep questions, 97 refused to be re-interviewed, 162 were lost to follow-up and 362 were confirmed dead through the National Death Index [NDI] and reports from relatives). The final sample consisted of 1085 participants. The median follow up was 904 days [interquartile range = 124 days]. Participants excluded were significantly more likely to be older, to be unmarried, to have lower scores on the *Mini Mental State Examination* (MMSE) and to report more diabetes, heart attack, stroke, hip fracture, high depressive symptoms and limitations in at least one activity of daily living (ADL).

Outcomes

Sleep complaints were assessed by asking participants how often in the past month they experienced the following: "have trouble falling asleep," "waking up several times per night," "difficulty staying asleep" and "waking up after the usual amount of sleep feeling tired and worn out." The frequency of sleep complaints was reported as "Not at all," "1-3 days," "4-7 days," "8-14 days" or "more than 15 days."

Quality of sleep was assessed by asking participants "during the past month, how would you rate your sleep quality overall?" Participants answered: "very good," "fairly good," "fairly bad" or "very bad."

Covariates

Baseline sociodemographic variables included age, gender, marital status and years of formal education. The presence of various medical conditions was assessed with a series of questions asking participants if they had ever been told by a doctor that they had arthritis, diabetes, hypertension, heart attack, stroke, cancer or hip fracture. Anthropometric measurements were collected in the home using methods and instructions similar to those employed in other EPESE studies. Height was measured using a tape placed against the wall and weight was measured using a Metro 9800 measuring scale. The Body Mass Index (BMI), computed by dividing weight in kilograms by height in meters squared (kg/m^2), was grouped according to National Institutes of Health (NIH) obesity standards (<25.0 = normal weight, 25.0 – <30 = overweight, 30 – <35 = obesity category I and ≥35.0 = obesity category II and extreme obesity) (25).

Cognitive function was assessed using the 30-item MMSE, the most frequently used cognitive screening measure in cognitive aging research (26-28). The English and Spanish versions of the MMSE were adopted from the Diagnostic Interview Scale and have been used in prior community surveys (26-28). Similar to previous studies on cognitive aging, especially in populations with low educational attainment, the MMSE score was dichotomized into < 21 (impaired or poor cognition) and > 21 (normal or unimpaired cognition) (29). Depressive symptomatology was measured with the *Center for Epidemiologic Studies Depression Scale* (CES-D) (30). To remove correlation with questions on sleep complaints, the CES-D scoring was modified to exclude the item “my sleep was restless.”

Functional disability was assessed using seven items from a modified version of the *Katz* ADL scale (31). ADLs included walking across a small room, bathing, grooming, dressing, eating, transferring from a bed to a chair and using the toilet. Participants who needed help with, or were unable to perform, one or more of the seven ADL activities were considered ADL-disabled.

Statistical analysis

Logistic regression analysis was used to estimate the odd ratios of sleep complaints for 15 or more days per month and poor quality of sleep (fairly bad/very bad vs. very good/fairly good) at 3 years of follow-up, controlling for baseline socio-demographics, medical conditions, BMI, high depressive symptoms, cognitive impairment and ADL disability. We defined insomnia using a composite measure of “trouble falling asleep” and “trouble staying asleep.” We also conducted sex-stratified analyses to examine differences in predictors of sleep complaints among men and women. All analyses were performed using the SAS System for Windows, Version 9.2 (SAS Institute, Cary, NC).

RESULTS

Table 1 presents the descriptive characteristics of the sample. The mean age was 80.8 years [Standard Deviation (SD) = 4.3] and 62% of participants were female. The most prevalent medical conditions were hypertension (62.3%), arthritis (59.1%) and diabetes (31.2%). Thirteen percent of participants had depressive symptoms, 27.6% had impaired or poor cognition (MMSE < 21), 28.4% had a BMI above 30 kg/m^2 and 22.1% reported limitation in one or more ADL activities.

Table 2 shows the percent of sleep complaints in all participants at 3 years of follow-up. Sleep complaints present for 15 or more days in the past month were considered as positive. Waking up several times per night was reported in 30% of participants followed by trouble falling asleep in 12.6%, trouble staying asleep in 11.4% and waking up feeling tired and

worn after the usual amount of sleep in 9.4% of participants. Women were significantly more likely to report trouble staying asleep and waking up feeling tired and worn after the usual amount of sleep than men (13.8% vs 10.7% and 11.1% vs 6.6%, respectively).

Table 3 presents the logistic regression analysis predicting the most severe sleep complaints (15 days or more) at 3 years of follow-up. High depressive symptomatology was found to be significantly associated with having trouble falling asleep. Diabetes, cancer and BMI ≥ 30 were significantly associated with waking up several times per night. Diabetes, hypertension, cancer and high depressive symptomatology were significantly associated with trouble staying asleep and with feeling tired and worn after waking up. ADL disability was significantly associated with feeling tired and worn after waking up. Sex-stratified analyses (table not shown) showed that different factors were associated with different sleep complaints in men and women. For example, high depressive symptoms were associated with all the sleep questionnaire items except “waking up several times per night” item in women. High depressive symptoms were associated only with “trouble falling asleep” in men. Diabetes was associated with all sleep questionnaire items except “trouble falling asleep” item in men. However, in women, diabetes predicted trouble falling asleep as well as frequent awakening. Another key sex difference was that, in women, BMI ≥ 30 Kg/m^2 and BMI ≥ 35 Kg/m^2 were significantly associated with feeling tired on waking up and waking up several times per night, respectively. Analyses in men showed that BMI ≥ 30 Kg/m^2 was significantly associated only with waking up several times per night.

Using a composite measure for insomnia (including both “have trouble falling asleep,” and “have trouble staying asleep”) showed an insomnia prevalence of 33.1% (33.4% in women and 32.5% in men; p-value=0.7577). Logistic regression analyses showed that diabetes and BMI ≥ 30 Kg/m^2 were significantly associated with insomnia in both men and women. Heart attack in women and cancer in men were also significantly associated with insomnia.

Table 4 shows the logistic regression analysis predicting poor quality of sleep (fairly bad/ very bad vs. very good/fairly good) at three years of follow-up. Being female, married and reporting arthritis, hypertension and high depressive symptomatology were found to be significantly associated with poor quality of sleep. Overall, 56.4% of participants reported fairly good sleep quality, 27% very good, 14% fairly bad and 2.6% very bad quality of sleep. Sex-stratified analyses showed that being married, history of heart attack and having high depressive symptoms were significantly associated with poor quality of sleep in women. High depressive symptoms was the only factor significantly associated with poor quality of sleep in men.

DISCUSSION

Our findings can be summarized as follows: Thirty percent of community dwelling elderly Mexican Americans reported sleep complaints. The most common complaint was waking up several times during the night (30%), which has consistently been found to be the most common complaint in elderly patients in past studies (4, 8, 9). In contrast, the study published by Ganguli showed a higher incidence of difficulties falling asleep (36%) vs. sleep continuity disorders (28%) as being the most common (32). The study used a slightly different methodology to assess sleep complaints and had a relatively younger population (average age 74 years) than our study (average age 80 years).

Diabetes and high depressive symptomatology were consistently associated with sleep complaints in our sample. Depression has specifically been linked with insomnia as reported by Foley (10) and, interestingly, it can work bi-directionally: insomnia may lead to depression and depressive mood can predict the presence of insomnia (33). The association

of diabetes and insomnia with sleep complaints could be explained by the frequent association of diabetes with sleep disordered breathing, autonomic neuropathy with ventilatory disorders, urinary incontinence, as well as chronic pain (34). Elevated BMI was significant only for waking up several times during the night. In addition, females were more likely to wake up feeling tired after their usual night's sleep and having trouble staying asleep.

One unresolved aspect of sleep quality is the role of age. Schubert et al. and Blazer et al. found increasing age associated with a higher incidence of self-reported sleep problems (4, 9). Our study found no relationship between age and subjective sleep complaints, consistent with Foley et al. and Jean Louis et al. (8, 35). An interesting theory postulated by Ancoli-Israel is that age itself is not a risk factor, since healthy elderly patients do not have a higher incidence of insomnia than younger groups (1). Rather, the associated age-related diseases and geriatric syndromes that increase with age also increase the risk of sleep problems (1).

Little has been written about sleep quality in the elderly Mexican-American population. Several studies of self-reported sleep quality in other older adult populations found differences in subjective sleep problems by race and gender. The Non-Hispanic White population appears to have a higher prevalence of sleep complaints than African Americans. The rate in our study is comparable to reports in older Non-Hispanic Whites and lower than that reported in older African Americans (9). Similar to past studies showing gender differences (8), we found that heart attack, high depressive symptoms and being married were associated with poor quality of sleep in women; in men, only high depressive symptoms was associated with poor quality of sleep.

Several medical conditions have been consistently associated with sleep problems including arthritis, cancer, hypertension and history of heart problems. Several authors have reported an additive effect of risk factors leading to increasing incidence of sleep problems in elderly patients (9, 36). The association of elevated BMI with frequent night awakening may be related to a number of factors. First, high BMI is closely linked to obstructive sleep apnea (OSA), which in turn is known to cause frequent waking and non-restful sleep (9, 36, 37). Unfortunately, we could not test this explanation as our database lacked information on clinical and polysomnographic indicators of OSA. Second, being obese or overweight has been shown to increase the odds of urinary incontinence, pain and arthritis, conditions known to disrupt sleep quality (38). For example, Kim and colleagues found that, among 925 community-dwelling women 70 years and older, obesity was independently associated with higher odds of reporting pain and urinary incontinence (38).

Limitations

This study has several limitations. First, we could not analyze the effect of the use of medications or respiratory symptoms on sleep compliance. Both are important factors related to sleep problems in other studies (8, 9). Even though questionnaires have been validated as useful to measure sleep problems, they lack objectivity and are subject to individual variations. Techniques such as polysomnography and actigraphy could be introduced in future studies to improve accuracy of sleep problem measurement.

Conclusions

Different risk factors were associated with different domains of sleep complaints. Future efforts should be focused on managing potentially treatable sleep-related risk factors (e.g., depression, arthritis, heart attack and high BMI) identified in the current study. Since poor sleep has been linked to poor outcomes in past studies in non-Hispanics, a good understanding of these factors may help in designing interventions to improve sleep quality

in very old Mexican Americans. Future studies are needed to investigate if different aspects of sleep complaints are associated with different outcomes (e.g., falls, cognition and mortality). Studies using objective tools (polysomnogram) are also needed to compare the prevalence and impact of sleep problems among elderly Mexican Americans and other ethnic groups.

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Table 1

Descriptive Characteristics of the Sample (N = 1085).

Predictor Variables	N (%)
Age, Mean ± SD	80.8 ± 4.3
Gender (Female)	673 (62.0)
Marital status (Married)	485 (44.7)
Arthritis	641 (59.1)
Diabetes	339 (31.2)
Hypertension	676 (62.3)
Heart attack	75 (6.9)
Stroke	61 (5.6)
Hip fracture	38 (3.5)
Cancer	68 (6.3)
Cognitive impairment (MMSE<21)	299 (27.6)
Depression (CES-D), Mean ± SD	10.3 ± 5.9
Any ADL limitation	240 (22.1)
BMI categories (kg/m2)	
<25	339(31.4)
25<30	434(40.2)
30>35	228(21.0)
≥35	80(7.4)

Table 2

Percent of Sleep Complaints at 3-Year Follow-up (N = 1085).

	Not at all N (%)	1-3 days N (%)	4-7 days N (%)	8-14 days N (%)	15 or more days N (%)
Trouble falling asleep	685 (63.1)	111 (10.2)	92 (8.5)	60 (5.5)	137 (12.6)
Wake up several times per night	436 (40.2)	148 (13.6)	96 (8.8)	80 (7.4)	325 (30)
Trouble staying asleep	700 (64.5)	97 (8.9)	91 (8.4)	73 (6.7)	124 (11.4)
Wake up after your usual amount of sleep feeling tired and worn	720 (66.3)	106 (9.7)	82 (7.6)	75 (6.9)	102 (9.4)

Table 3

Logistic Regression Predicting Sleep Complaints (15 or more days) at 3-Year Follow-up Among Older Mexican Americans Aged 75 Years and Older (N = 1085).

	Trouble Falling Asleep 0R (95% CI)	Wake Up Several Times Per Night 0R (95% CI)	Trouble Staying Asleep 0R (95% CI)	Wake Up After Your Usual Amount of Sleep Feeling Tired and Worn 0R (95% CI)
Age	0.99 (0.95, 1.04)	1.01 (0.98, 1.04)	1.00 (0.95, 1.05)	1.04 (0.99, 1.09)
Gender (Female)	1.18 (0.76, 1.82)	0.94 (0.69, 1.28)	1.07 (0.68, 1.69)	1.50 (0.88, 2.55)
Marital status (Married)	1.13 (0.75, 1.69)	1.15 (0.85, 1.55)	1.40 (0.91, 2.14)	1.37 (0.85, 2.21)
Arthritis	1.42 (0.95, 2.13)	1.03 (0.78, 1.37)	1.13 (0.75, 1.71)	1.39 (0.86, 2.25)
Diabetes	1.26 (0.86, 1.87)	1.58 (1.18, 2.11)	1.91 (1.28, 2.84)	1.69 (1.09, 2.61)
Hypertension	1.14 (0.76, 1.71)	1.18 (0.88, 1.58)	1.60 (1.02, 2.51)	1.89 (1.13, 3.13)
Heart attack	1.61 (0.98, 2.64)	0.73 (0.42, 1.28)	1.00 (0.57, 1.72)	0.98 (0.53, 1.81)
Stroke	0.61 (0.31, 1.21)	1.68 (0.97, 2.92)	1.02 (0.55, 1.90)	0.79 (0.38, 1.65)
Hip fracture	0.87 (0.40, 1.92)	1.10 (0.52, 2.35)	1.36 (0.63, 2.96)	1.26 (0.55, 2.90)
Cancer	1.67 (0.87, 3.21)	2.09 (1.26, 3.47)	2.80 (1.53, 5.12)	2.04 (1.00, 4.18)
Cognitive impairment (MMSE<21)	1.11 (0.73, 1.67)	0.72 (0.53, 0.99)	0.94 (0.60, 1.47)	1.16 (0.72, 1.85)
CES-D score	1.04 (1.01, 1.07)	1.00 (0.97, 1.02)	1.04 (1.01, 1.07)	1.06 (1.02, 1.09)
Total ADLs	0.97 (0.85, 1.10)	1.00 (0.91, 1.10)	0.96 (0.83, 1.10)	1.13 (1.00, 1.27)
BMI categories (kg/m^2)				
<25	1.00	1.00	1.00	1.00
25<30	1.14(0.72, 1.81)	1.11(0.80, 1.54)	1.02(0.63, 1.69)	1.28(0.73, 2.225)
30>35	1.11(0.65, 1.90)	1.51(1.03, 2.21)	1.57(0.92, 2.68)	1.58(0.86, 2.91)
≥35	1.73 (0.86, 3.45)	2.33 (1.37, 3.96)	1.20(0.55, 2.62)	1.91 (0.86, 4.24)

Table 4

Logistic Regression Predicting Poor Quality of Sleep (fairly bad/very bad vs. very good/fairly good) at 3-Year Follow-up Among Older Mexican Americans Aged 75 Years and Older (N = 1085).

	0R (95% CI)
Age	0.98 (0.94, 1.03)
Gender (Female)	1.67 (1.12, 2.50)
Marital status (Married)	1.71 (1.18, 2.49)
Arthritis	1.24 (0.86, 1.79)
Diabetes	1.35 (0.95, 1.92)
Hypertension	1.25 (0.86, 1.80)
Heart attack	1.67 (1.07, 2.63)
Stroke	0.97 (0.56, 1.67)
Hip fracture	1.15 (0.59, 2.24)
Cancer	1.56 (0.84, 2.87)
Cognitive impairment (MMSE<21)	1.36 (0.71, 1.51)
CES-D score	1.07 (1.04, 1.09)
Total ADLs	1.05 (0.95, 1.17)
BMI categories (kg/m^2)	
<25	1.00
25<30	0.93(0.61, 1.41)
30>35	1.25(0.79, 1.99)
≥35	1.20(0.62, 2.32)