

Chronic Painful Physical Conditions, Disturbed Sleep and Psychiatric Morbidity: Results from an Elderly Survey

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Background. The main purpose of this study is to investigate the association of disturbed sleep, chronic physical pain and psychiatric morbidity in people aged 60 years and over.

Methods. A population-based random sample of 7040 household residents aged 60 years and over, was examined in a face-to-face interview. Painful medical conditions were assessed through questions evaluating medical treatment, hospitalizations, and consultations for medical problems. Disturbed sleep was assessed through questions concerning the presence of sleeping problems in the past 4 weeks.

Results. The overall prevalence of disturbed sleep is 33.7% (95% CI: 32.5–34.8) and the 6-month prevalence of any chronic pain was 76.2 % (95% CI: 74.2–78.2%). A substantial burden of disturbed sleep is associated with the presence of physical pain morbidity, 42.5% for back pain to 49.7% for headaches. The prevalence of pain among persons with disturbed sleep ranges from 25.8% for gastrointestinal pain to 54.6% for joint pain. The presence of comorbid pain and disturbed sleep has an important disability impact as assessed by socioeconomic/professional data, health care utilization, self-rated health and physical activity. In logistic regression models, headaches, psychiatric morbidity, rural origin, Caucasians, self-rated health and number of chronic pain conditions were significantly associated with disturbed sleep after controlling for demographic variables and comorbidities. Age has a negative effect on sleep complaints.

Conclusions. Disturbed sleep is highly comorbid with other pain conditions particularly headaches and psychiatric morbidity in later life. The combination of pain and disturbed sleep leads to important role disability and increased utilization of medical services.

Keywords Epidemiology, Disturbed sleep, Insomnia, Pain, Elderly, Mental disorders, Comorbidity

INTRODUCTION

Several studies have shown insomnia to be highly prevalent among adults: the estimated rate for insomnia in general community surveys ranges from 6 to 40% (1–6). As insomnia is an accompanying symptom of many psychiatric and physical illnesses, estimated prevalence in clinical medical settings is higher and ranges from 10 to 50% (7–9).

Studies in elderly populations are less common but also report high prevalence of disturbed sleep at 30%, while estimated rates are higher among elderly women (4,10–13).

In recent years, fewer studies have investigated the relationship between physical pain and insomnia in the general elderly population. Some of the studies have provided evidence that pain is associated with sleep complaints (5,14–15).

A significant limitation of these studies, however, is the fact that they assessed pain in a general way or investigated insomnia and one single specific pain combination. Given the high physical comorbidity among the elderly, addressing the independent contribution of pain, within a wide range of chronic

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physical and mental conditions in association with disturbed sleep, may be of interest.

A recent study by Ohayon (16) tried to overcome this limitation by making direct assessment of the relationship between chronic physical conditions, common mental disorders and insomnia in a large epidemiological study of an adult population. Using multivariate models, he showed that backaches and joint diseases, were at least as importantly associated with insomnia as mood disorders. We are aware of no previous population based investigation, using face-to-face interviews, that has assessed the relative contribution of chronic physical pain, mental morbidity and disturbed sleep in an elderly household survey.

The main purpose of the present study is to assess the extent to which comorbid painful conditions account for sleep complaints in a community dwelling elderly population. A second aim is to evaluate a range of different disturbed sleep predictors.

METHODS

Sample

This study is a representative, face-to-face household survey of 7,000 subjects, aged 60 years old or older, conducted from 1995 to 1996. Respondents were selected from a multistage area probability sample of non-institutionalized population in the state of Rio Grande do Sul, Brazil. All subjects were assessed through an interview that included assessment of sociodemographic characteristics, mental health and physical health. Further details on the methods can be found elsewhere (17). The response rate was high, 99%. Participants gave oral consent before proceeding with the interview. This subsequent analysis was approved by the Ethics Committee of the Federal University of São Paulo- UNIFESP.

Disturbed Sleep

All respondents completed the Short Psychiatric Evaluation Schedule (SPES) developed by Pfeiffer (18) and other questions about mental health and addictive behavior during the past 30 days. In this paper we employed a subjective measure of sleep quality derived from one item included in the SPES questionnaire: In the last 30 days "Is your sleep fitful and disturbed?" Answers are based on simple absent/present fashion. Longitudinal studies on chronic sleep problems have shown that insomnia symptoms often change over time so questioning focuses on the four-week period before the interview, so that emphasis rests firmly on current sleep status rather than on the individual's lifetime experience of morbidity (19).

Assessment of Chronic Pain

The study included a list of five chronic physical disorders: headaches, joint pains, back pain, gastrointestinal pain or chest

pain. With the exception of headaches, where the recall period was 1 month, respondents were asked whether they had experienced pain at any time in the last 6 months. A positive illness score was assigned if the individual reported any form of treatment whether or not this included physician contact (outpatient or inpatient) and independent of the kind of treatment offered (counseling, orientation, medication, etc.). Research on methods has shown that self-report of chronic physical conditions shows satisfactory agreement with medical records data (20). There is no way to compare the severity or chronicity of these disorders although they are usually chronic.

Mental Health Evaluation

The assessment instrument was a reduced version of the Older Americans Resources and Services (OARS) mental health screening questionnaire, the Short Psychiatric Evaluation Schedule—SPES (18), designed for use with trained lay interviewers. The reduced questionnaire, designed to detect psychiatric morbidity among elderly subjects, involves 6 "yes/no" questions regarding several aspects of elderly mental functional status in the past month. Previous psychometric research documented that the validity coefficients for this reduced version at the 1/2 cut-off point were: sensitivity 82% and specificity 77% (21). This abbreviated 6-item version of the SPES has comparable validity to the original 15-item version. In addition, correlations between screening scores and various clinical ratings made during the psychiatric interview were all statistically significant, indicating that the screening score identifies psychiatric morbidities such as anxiety and depression states.

Other Variables Investigated

Several other data were gathered on: professional activity (active/ non active); physical activity (yes/no); medical consultations in outpatient facilities in the past six months (yes /no); number of hospitalizations in the previous year (0 or 1 +). Self-rated health was assessed by asking patients the following question: "How would you consider your health?" The question generates a rating evaluated on a 5-point scale: very good, good, regular, bad, very bad. Questioning concentrated on the last few days, so the evaluation is based on current health status. For the purposes of this investigation, an impaired (regular, bad, very bad)/non-impaired (good, very good) dichotomy was used.

Analysis

Cross tabulations were used to calculate frequencies and associations. Univariate comparisons were carried out by χ^2 tests. Logistic regression model was chosen to describe the relationship between disturbed sleep and the set of independent

variables. Adjusted Odds Ratio (OR) with 95% Confidence Interval was estimated. We retained only variables significant at the $p < .05$ level. *Statistical Package for Social Sciences* (SPSS), version 10.0 was used to analyze the data

RESULTS

The study sample consisted of 6963 individuals who provided valid responses to the survey question concerning disturbed sleep and chronic physical pain. The sample's demographic profile is provided in Table 1.

One third of the population, 33.7% (95% CI: 32.5–34.8%), showed disturbed sleep in the prior month. The 6 month prevalence of any pain was 76.2 % (95% CI: 74.2–78.2%). The most prevalent chronic pain was joint pain among women (49.5%) and back pain (34.7%) among men (see Table 2).

Table 1 Sociodemographic Characteristics

Gender	n	%
Female	4593	66
Male	2368	34
Age		
60–64	1866	26.8
65–70	2085	29.9
71–74	1067	15.3
75–80	1216	17.5
81+	727	10.4
Income		
<US\$200/month	4323	62.1
≥US\$200/month	2414	34.7
Birth		
Rural	4529	65
Urban	2363	33.9
Marital Status		
Married	3161	45.4
Widow	2969	42.6
Single/divorced	830	11.9
Education		
<4 Years	5891	84.6
≥4 Years	1047	15
Ethnicity		
Caucasian	5862	84.2
Non-Caucasian*	1098	15.8

*African-descendants, Asian, Others.

Table 2 30-day Prevalence of Disturbed Sleep among Respondents with Chronic Physical Disease

Disorder	30-day prevalence % (SE)	Number of subjects
Headaches	49.7 (0.01)	2248
Gastrointestinal	47.6 (0.01)	1272
Chest pain	45.3 (0.01)	1959
Joint	42.7 (0.01)	2999
Back pain	42.5 (0.01)	2997

30-day Prevalence of Disturbed Sleep among Respondents with Chronic Physical Disease

As indicated in the top row of Table 2, half of the respondents with headaches reported disturbed sleep. The 30-day prevalence of disturbed sleep among subjects with back pain (42.5%), joint pain (42.7%), chest pain 45.3%, and gastrointestinal pain (47.6%) was also high.

Prevalence of 6-month Chronic Physical Pain among Respondents with Disturbed Sleep

As shown in Table 3, chronic pain disorders are more common among persons with disturbed sleep than among those without. The prevalence of headaches and gastrointestinal pain was nearly twice as high among persons who reported disturbed sleep as those without at $47.6\% \times 24.7\%$ and $25.8\% \times 14.5\%$ respectively. The prevalence of chest, joint and back pain was nearly one and a half times as high among respondents with disturbed sleep ($37.8\% \times 23.4\%$; $54.6\% \times 37.5\%$; $54.3\% \times 37.6\%$ respectively).

Impact of Disturbed Sleep and Pain Comorbidity on Professional Activity, Income, Health Care Utilization, Self-rated Health and Physical Activity

For the following analysis, subjects with and without disturbed sleep were contrasted within each chronic pain group. As indicated in Table 4 persons with disturbed sleep and pain comorbidity were more likely to be in the following categories: low income, more outpatient consultations, more hospitalizations, poorer self-rated health, less physical activity and not involved in professional activities.

Associations between Disturbed Sleep and Pain Disorders

Logistic regression was conducted to estimate the likelihood of having disturbed sleep based on the presence of each chronic pain and psychiatric morbidity after adjusting for possible sociodemographic factors. As the co-occurrence of painful problems is pervasive in the elderly population, a supplementary variable, "number of simultaneous chronic pain disorders," was computed and used in the logistic analysis. We also examined possible interactions between all pain conditions, each pain condition and gender, age, education, ethnicity, origin (see Table 5).

DISCUSSION

In this sample of elderly subjects in Brazil, prevalence rates were 33.7 % for disturbed sleep and 76.2% for any

Table 3 Prevalence of 6 Month Chronic Physical Disease among Subjects with Disturbed Sleep

Disturbed Sleep	Headache % (SE)	Gastroint. % (SE)	Chest Pain % (SE)	Joint % (SE)	Back Pain % (SE)	N
Yes	47.6* (0.01)	25.8* (0.01)	37.8* (0.01)	54.6* (0.01)	54.3* (0.01)	2346
No	24.7 (0.01)	14.5 (0.01)	23.4 (0.01)	37.5 (0.01)	37.6 (0.01)	4584
Ratio	1.9	1.8	1.7	1.5	1.4	

$p \leq .000$.

Table 4 Impact of Disturbed Sleep and Pain Comorbidity on Professional Activity, Income, Health Care Utilization, Self-rated Health and Physical Activity*

	Disturbed Sleep		
Comorbidity Impact	No	Yes	<i>P</i>
Headache			
Professional activity (% yes)	12.6	8.9	.006
Income (% high)	28.1	20.8	.000
Medical consultation (% yes)	72.6	79.7	.000
Hospitalizations (1+)	21.8	27.8	.001
Self-rated health (% impaired)	71.0	87.6	.000
Physical activity (% yes)	36.6	30.7	.004
Chest Pain			
Professional activity (% yes)	10.2	8.9	.39
Income (% high)	35.6	25.1	.000
Medical consultation (% yes)	85.7	88.1	.13
Hospitalizations (1+)	30.0	33.7	.09
Self-rated health (% impaired)	76.6	91.9	.000
Physical activity (% yes)	35.0	31.9	.06
Joint Pain			
Professional activity (% yes)	12.2	8.1	.000
Income (% high)	33.3	24.4	.000
Medical consultation (% yes)	76.3	80.9	.003
Hospitalizations (1+)	19.1	27.4	.000
Self-rated health (% impaired)	69.2	86.7	.000
Physical activity (% yes)	36.5	31.3	.003
Gastrointestinal Pain			
Professional activity (% yes)	14.7	7.6	.000
Income (% high)	38.7	24.0	.000
Medical consultation (% yes)	75.4	82.9	.001
Hospitalizations (1+)	24.4	28.6	.004
Self-rated health (% impaired)	72.5	90.9	.000
Physical activity (% yes)	42.1	32.9	.001
Back Pain			
Professional activity (% yes)	13.4	9.0	.000
Income (% high)	36.6	24.5	.000
Medical consultation (% yes)	75.4	81.7	.000
Hospitalizations (1+)	18.8	28.2	.000
Self-rated health (% impaired)	67.9	87.7	.000
Physical activity (% yes)	38.6	32.2	.001

*Values expressed as percentage.

pain, respectively. Compared with other studies, prevalence rates are similar for insomnia (1–4,9,13) and higher for chronic pain (22–24).

The co-occurrence of disturbed sleep and chronic physical disease is pervasive in this population. Among individuals with current chronic physical conditions, 42.5% to 49.7% had disturbed sleep. Disturbed sleep frequency for subjects who also

Table 5 Results of Logistic Regression for Elderly with Disturbed Sleep

Variable	Odds Ratio	95% Confidence Interval	
Psychiatric morbidity	2.504	2.229	2.813
Rural origin	1.380	1.225	1.554
Caucasian	1.212	1.043	1.409
Age (yrs)	0.992	0.985	1.000
Self-rated health (impaired)	1.970	1.728	2.245
Headaches	1.575	1.268	1.957
Number of pain disorders	1.319	1.260	1.380

had a chronic physical condition was lower for gastrointestinal pain and chest pain, 25.8% and 37.8% respectively, and higher for back pain and joint pain, 54.3% and 54.6% respectively.

The association of current disturbed sleep and chronic physical pain was combined with greater impact in socioeconomic, disability and health-care utilization than having either problem alone. The relationship among disturbed sleep, disability and health-care utilization are probably complex in nature. Longitudinal studies could demonstrate a bidirectional relationship between them. Insomnia, pain, poorer self-health perception and decreased physical activity may be mutually reinforcing with each making the other more likely and each increasing the probability of poorer outcomes among elderly subjects. Associations between self-rated health and disturbed sleep are likely to be inflated, because these experiences may be part of the insomnia complaint itself. Report bias, in that disturbed sleep subjects are more prone to remember and report negatively, is another mechanism potentially leading to inflated frequencies of impaired self-health.

After controlling for the influence of several known risk factors, the variables most strongly associated with disturbed sleep were psychiatric morbidity, rural origin, being Caucasian, age, self-rated health, headaches, and number of pain disorders. A measure of overlap has long been recognized between insomnia and psychiatric morbidity, as these experiences may well be part of a depressive syndrome itself, thus perhaps explaining the strong relationship observed between disturbed sleep and psychiatric morbidity. Presence of headaches is likely to increase the probability of sleep complaints. There was a protective association with age in that as age increases, the risk of disturbed sleep decreases. Moreover, as the number of chronic pain conditions increases, association with disturbed sleep gets stronger. Our results suggest that

insomnia should be examined within a context of combined comorbid chronic pain conditions. Results like these strongly argue that the clinical assessment of elderly patients suffering from disturbed sleep must include evaluation of potentially relevant comorbid mental and physical pain conditions that might increase the likelihood of sleep complaints.

Some negative findings are of interest. After controlling for sociodemographic factors women were not at significantly increased risk of disturbed sleep relative to men. With the exception of headaches, not all chronic physical pain was more common among subjects with sleep complaints. Back pain, chest pain, gastrointestinal pain and joint pain were not significantly more common among subjects with disturbed sleep than persons without disturbed sleep. In addition, no pain–pain interaction was observed nor between pain and sociodemographic variables. As disturbed sleep is predisposed in combination with several physical diseases, we have no hypothesis to interpret why insomnia is associated with some diseases and not others.

The present study has several strengths compared to other studies in the field. As mentioned previously we used the largest sample size in a community investigation of disturbed sleep and chronic pain exclusively within elderly populations. The response rate was high.

Several limitations of this study need attention. The evaluation of disturbed sleep was based on self-report of disrupted sleep. Data on diagnosis, duration and severity was not collected. One important problem is that the fitful or disturbed sleep may be attributed to many causes and retrospective reports are of questionable validity. This is a non-standardized definition of disturbed sleep, thus, it is difficult to compare to other investigations. Moreover no objective measure was obtained. However, prior research suggests that self-reports on sleep may be inconsistent with polysomnographic recordings generated on the same night, demonstrating that sleep has both an objective and subjective basis (25). Ascertainment of combined chronic pain physical conditions was also by self-report and not by operational or objective criteria. However, prior research suggests that self-report of common chronic diseases shows moderate to strong agreement with medical records. In addition, the nature of such pain complaints is usually accompanied by subjective components and cannot be explained by demonstrable physical lesions or physiological dysfunction (20,26).

In conclusion, among persons with disturbed sleep, both chronic physical pain conditions, mainly headaches, and psychiatric morbidity were common. Elderly subjects with a combination of disturbed sleep and chronic pain condition appear to be seriously handicapped and suffer role disability as demonstrated by the use of medical services, self-rated health and socioeconomic status.

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