Sleep Quality in Chronic Pain Patients

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Objective: Chronic pain patients have been reported to complain about poor sleep quality. Research aimed at delineating the predictors of poor sleep has produced conflicting results. Depressive mood and pain severity are the most frequently encountered predictors. This study aimed to find out whether chronic pain patients differed from healthy control subjects who had no pain on subjective sleep quality measures and, if so, which factors contributed most to poorer sleep quality.

Method: We compared 40 patients with chronic pain who met inclusion criteria with 40 healthy control subjects on the measures of sleep quality, anxiety, and depression. The predictors of sleep quality were investigated with multiple regression in the pain group.

Results: Chronic pain patients had higher scores than did healthy control subjects on the Beck Anxiety Scale, the Beck Depression Inventory (BDI), and the Pittsburgh Sleep Quality Index (PSQI). At the bivariate level, pain intensity, anxiety, and depression correlated significantly with poorer sleep quality. At the multivariate level, depression was found to be the only significant factor correlating with the quality of sleep, and the model explained 34% of the variance.

Conclusions: Chronic pain patients suffer from poor sleep quality—a function of depressed mood rather than pain intensity, duration, or anxiety. However, it is difficult to draw a causal relation in this relatively small sample size. Besides, our study sample comprised a mostly psychiatric population and may not represent the general group of patients with chronic pain.

(Can J Psychiatry 2002; 47: 844–848)

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Clinical Implications

- Chronic pain patients suffer from poorer quality of sleep than do healthy control subjects.
- This poorer sleep quality is a function of depressed mood rather than of pain duration, intensity, or anxiety.
- Antidepressant therapy may be effective in relieving sleep complaints associated with chronic pain.

Limitations

- Self-reported data were presented on sleep quality. Subjective and objective measures of sleep quality need not correlate well with each other.
- The findings are cross-sectional in nature, and the direction of causality cannot be determined definitively.
- The sample size is relatively small to generalize.

Key Words: *chronic pain, sleep, depression, anxiety, pain intensity*

It has been estimated that between 50% and 88% of patients with chronic nonmalignant pain disorders have significant sleep complaints (1–4). Disturbed sleep may interfere with the daily functioning of the patients, and poor sleep may be a contributing factor, to the extent that it increases one's sensitivity to pain (5,6). It has been suggested that sleep disturbance in chronic pain patients may increase pain sensitivity and create a self-perpetuating cycle of sleep disruption, increased pain, and depression (7). Chronic pain patients often experience significant mood disturbance along with sleep disturbance (3). Psychological distress has been found to be more intense among chronic pain patients who also report poor sleep than in those without concomitant sleep disturbance (1). Various studies have uniformly found that pain severity and the level of depressive symptoms associate with the degree of sleep impairment (1,2,8,9). Some of these studies have found that depression severity, as opposed to pain severity, is more associated with sleep disturbance in patients with chronic pain (1,2,9). Other studies suggest that depression severity may not be the primary mediating variable (3,10). Presleep cognitive arousal is also reported to be the primary predictor of sleep quality in chronic pain patients (4). In one study, physical functioning, duration of pain, and age were found to be more important than were pain intensity and depressed mood in contributing to decreased overall sleep quality and sleep latency (11). We wanted to delineate the predictors of sleep quality in a sample of chronic pain patients. Further, we wanted to see whether chronic pain patients differed from healthy control subjects with no pain on subjective sleep quality measures and, if so, which factors contributed most to poorer sleep quality.

Method

Subjects

A total of 40 eligible consecutive chronic pain patients were evaluated in Vakif Gureba Training and Research Hospital (VGTRH), Istanbul, in the first 6 months of the year 2000. VGTRH is a tertiary care hospital with 600 beds, where the first author served as a consultant psychiatrist for 3 years. Referral sources included general medicine clinics and primary care physicians in the community. Patients suffering from chronic nonmalignant pain ($n = 40$) were compared with 40 healthy control subjects without pain. The pain sample consisted of 32 women and 8 men, with a mean age of 37.1 (SD 11.9) years. Of the patients, 26 suffered from headaches, 12 from backaches, and 2 from neck aches. The main pain duration was 8.4 (SD 6.7) years. Patients having a psychotic disorder, cognitive impairment, medical illness known to interfere with sleep (that is, heart disease or chronic obstructive pulmonary disease), and substance use disorder (current or within the 3 months) were excluded from the study. Also excluded were patients who had been taking medications that alter sleep

or who were illiterate and unable to complete the questionnaires. None of the eligible patients who were asked to participate in the study refused, and they all gave informed consent. The interviewers collected sociodemographic data. Individuals completed self-report questionnaires that measured pain, depression, anxiety, and sleep quality.

Measures

The Pittsburgh Sleep Quality Index (PSQI) is a self-rated questionnaire that provides an index of sleep quality for a 1-month interval (12). The PSQI comprises 19 self-rated questions and is an instrument with established reliability and validity. These 19 items are grouped into 7 component scores, each weighted equally on a 0-to-3 scale. The 7 component scores are then totalled to provide a global PSQI score, which has a range of 0 to 21, with higher scores indicating worse sleep quality. The PSQI has been shown to be valid and reliable in Turkish population studies, with a Cronbach alpha of 0.80 and test–retest reliability of 0.93 to 0.98 (13). We took the global score as an index of sleep quality in our study. We also took scores > 6 on PSQI as an indicator of poor sleep quality.

The Beck Depression Inventory (BDI) is a 21-item, self-report questionnaire that assesses severity of depression (14). Individuals are asked to rate themselves on a 0-to-3 spectrum ($0 = $ least and $3 = $ most), with a score range of 0 to 63. The total score is a sum of all items. It was shown to be valid and reliable in Turkish (15).

The Beck Anxiety Inventory is a 21-item, self-report questionnaire (16) in which each item is rated on a 4-point Likert scale ranging from 0 (not at all) to 3 (severely, I could barely stand it). The total score ranges from 0 to 63. It was shown to be valid and reliable in Turkish (unpublished data).

The patients used a Visual Analog Scale (VAS) to rate the pain intensity. A 10-cm VAS was used with anchors of "no pain" and "pain as bad as it could be." Most studies that compare VAS with numerical and verbal ratings conclude that the VAS or the numerical ratings are statistically preferable to the verbal rating scales (17).

Patients also rated their disability on a scale from 0 to 4, with higher scores indicating more disability.

Data Analysis

Groups were compared at the bivariate level using t-tests for continuous variables and chi-square tests for categorical variables. Bivariate relations between continuous variables were examined with Pearson product-moment correlations (r). Multiple linear regression analyses were used to predict scores on the PSQI. The pain group was dichotomized as good and bad sleepers and compared. The SPSS carried out all the procedures (18).

Table 1 Description of sample by group (*n* = 80)				
	Total sample (*n* = 80)	Chronic pain patients (*n* = 40)	Healthy control subjects (*n* = 40)	Significance test[a]
Women (%)	78.8	80	77.5	χ^2 = 0.08; df 1
Age: mean (SD)	36.7 (11.7)	37.15 (11.9)	36.3 (11.6)	*t* = 0.32; df 78
Marital status (% married)	75	77.5	72.5	χ^2=0.27; df 1
Occupational status (% employed)	40	37.5	42.5	χ^2=0.21; df 1
Education level (% primary school or less)	51.2	62.5	40	χ^2 = 4.1[b]; df 1
Economic status (%)				χ^2=0.08; df 1
Bad	16.3	22.5	10	
Medium	72.5	70	75	
Good	11.3	7.5	15	
Beck Anxiety Score: mean (SD)	16.6 (12.9)	20.5 (12.2)	12.7 (12.4)	*t* = 2.8[c]; df 78
Beck Depression Score: mean (SD)	14.3 (12.4)	19.4 (12.2)	9.2 (10.6)	*t* = 4.0[d]; df 78
Pittsburgh Sleep Quality Index: mean (SD)	6.1 (3.8)	8.2 (3.9)	4.0 (2.3)	*t* = 5.8[d]; df 63.3

[a]Chronic pain patients vs healthy control subjects
[b]$P \leq 0.05$; [c]$P \leq 0.01$; [d]$P \leq 0.001$

Results

Sociodemographic and Psychological Characteristics of Sample

Table 1 presents the sociodemographic and psychological characteristics of the total sample, as well as by group. Of the total sample, 79% were women, the mean age was 37 years, 75% were married, and 40% were employed. Chronic pain patients were significantly less educated than were healthy control subjects, but their economic status was similar. Chronic pain patients had higher scores than did healthy control subjects on the Beck Anxiety Scale, the Beck Depression Inventory, and the PSQI.

Predictors of Sleep Quality

Tables 2a and 2b illustrate 2 multiple regression models of sleep-quality determinants. Pearson product-moment correlations between the PSQI and age, sex, pain duration, pain intensity, and the scores on the different scales are presented in the first column of both tables. Table 2a shows the first model. At the bivariate level, pain intensity, anxiety, and depression correlated significantly with poorer sleep quality. At the multivariate level, depression was found to be the only significant predictor of the poor sleep quality in Model 1, and the model explained 34% of the variance.

Table 2b shows the second model. At the bivariate level, age, sex, and pain duration did not significantly correlate with poorer sleep quality. Again, depression was found to be the only significant predictor of the poor sleep quality in Model 2, and the model explained 31% of the variance.

When chronic pain patients were dichotomized as good and bad sleepers according to a cut-off score of 6 in the PSQI, bad sleepers (*n* = 23, PSQI scores > 6) scored significantly higher on the BDI than did good sleepers (*n* = 17) (23.6 [SD 12.9] vs 16.1 [SD 7.6]; *t* = 2.76, *P* = 0.009). There was no significant statistical difference on the measures of anxiety, pain intensity, disability, and pain duration between good and bad sleepers.

Discussion

Our study shows that chronic pain patients are more anxious, have more depression, and suffer from poorer sleep, compared with healthy control subjects. Rates of depressive disorders among chronic pain patients are high, ranging from 30% to 87% (19). Depression may evoke chronic pain by increasing pain sensitivity and lowering pain-tolerance thresholds. Secondary depression may occur as a reaction to chronic pain (20). Thus, pain may be specified both as a cause and as an effect of depression. Anxiety may be an important concomitant of clinical depression associated with chronic pain. In our study, pain intensity did not differ between poor and good sleepers. This contrasts with some research findings, wherein pain intensity was associated with poor sleep quality (10). Our findings are in line with the Atkinson and others study in which depressed mood was the strongest predictor of sleep satisfaction (2). Similarly, our findings are in line with another study that was conducted with rheumatoid arthritis patients; in it, multiple regression analysis revealed an association between sleep problems and depression that was independent of pain, functional impairment, and other demographic variables (6). Conversely, Morin and others found that individuals with

Table 2 Two multiple models of sleep quality determinants (_n_ = 80)

	_r_	β	SE
Model 1			
Pittsburgh Quality of Sleep Index			
Pain duration	−0.03	−0.03	0.09
Disability	0.19	1.4	1.2
Pain intensity	0.26[a]	0.28	0.32
Anxiety	0.41[b]	−0.03	0.06
Depression	0.6[c]	0.22[c]	0.06
Constant	—	0.84	—
Adjusted R^2	—	—	0.34[b]
Model 2			
Pittsburgh Quality of Sleep Index			
Age	0.07	−0.03	0.1
Sex	−0.03	0.9	1.4
Pain duration	−0.03	−0.04	0.1
Pain intensity	0.26[a]	0.43	0.3
Anxiety	0.41[b]	−0.03	0.08
Depression	0.6[c]	0.21[b]	0.07
Constant	—	2.8	—
Adjusted R^2	—	—	0.3[b]

[a] $P \leq 0.05$; [b] $P \leq 0.01$; [c] $P \leq 0.001$
_r_ = Bivariate Pearson Correlation; β = Unstandardized Regression Coefficient

sleep complaints reported greater pain intensity and unpleasantness than did those without sleep complaints (3). Our findings imply that the poor sleep quality of chronic pain patients is mediated via their affective disturbance. Depression causes sleep disruption in chronic pain patients, independent of pain intensity, pain duration, and anxiety. In a study by Pilowsky and others, depressed mood, but not anxiety, was likely to predict poor sleep in chronic pain patients (1). In our study, disability as reported by the patients or by the chronicity of pain did not predict sleep quality, in contrast to some reports (11). Our study, however, has the following caveats: 1) Our data were self-reported data of sleep quality, whereas sleep disturbances are measured most accurately with the use of polysomnography, and subjective and objective measures of sleep quality need not correlate well with each other; 2) our findings are cross-sectional in nature, and the direction of causality cannot be determined definitively; 3) our sample size is relatively small to generalize; 4) our pain sample is heavily weighted with headache patients, who by themselves might comprise a distinct group. This psychiatric population is unlikely to represent the general group of patients with chronic pain. In conclusion, in our relatively small sample, chronic pain patients suffer from poor sleep quality that is a function of depressed mood, rather than of pain intensity, duration, or anxiety.

References

1. Pilowsky I, Crettenden I, Townley M. Sleep disturbance in pain clinic patients. Pain 1985;23:27–33.
2. Atkinson JH, Anconi-Israel S, Slater MA, Garfin SR, Gillin JG. Subjective sleep disturbance in chronic back pain. Clin J Pain 1988;4:225–32.
3. Morin CM, Gibson D, Wade J. Self-reported sleep and mood disturbance in chronic pain patients. Clin J Pain 1998;14:311–4.
4. Smith MT, Perlis ML, Smith MS, Giles DE, Carmody TP. Sleep quality and presleep arousal in chronic pain. J Behav Med 2000;23:1–13.
5. Moldofsky H, Scarisbrick P. Induction of neurasthenic musculoskeletal pain syndrome by selective sleep stage deprivation. Psychosom Med 1976;38:35–44.
6. Nicassio PM, Wallston KA. Longitudinal relationships among pain, sleep problems, and depresssion in rheumatoid arthritis. J Abnorm Psychol 1992;3:514–20.
7. Moldofsky H. 'Psychogenic rheumatism' or the 'fibrositis syndrome.' In: Hill O, editor. Volume 3. Modern trends in psychosomatic medicine. London: Butterworths; 1976. p 187–95.
8. Affleck G, Urrows S, Tennen H, Higgins P, Abeles M. Sequential daily relations of sleep, pain intensity, and attention to pain among women with fibromyalgia. Pain 1996;68:363–8.
9. Haythornthwaite JA, Hegel MT, Kerns RT. Development of a sleep diary for chronic pain patients. J Pain Symtom Manage 1991;65:65–71.
10. Wilson KG, Watson ST, Currie SR. Daily diary and ambulatory activity monitoring of sleep in patients with insomnia associated with musculoskeletal pain. Pain 1998;75:75–84.

11. Menefee LA, Frank ED, Doghramji K, Picarello K, Park JJ, Jalali S, and others. Self-reported sleep quality and quality of life for individuals with chronic pain conditions. Clin J Pain 2000;16:290–7.

12. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index : a new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193–213.

13. Agargun MY, Kara H, Anlar Ö. Validity and reliability of the Pittsburgh Sleep Quality Index in Turkish sample. Turkish Journal of Psychiatry 1996;7:107–15.

14. Beck AT, Waed CH, Mendelson M. An inventory for measuring depression. Arch Gen Psychiatry 1961;4:561–71.

15. Hisli N. The reliability and validity study of the Beck Depression Inventory in a Turkish sample. Psikoloji Dergisi 1988;6:118–22.

16. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol 1988;56:893–7.

17. Hujkisson HC. Visual analog scales. In: Handbook of psychiatric measures. Washington (DC): American Psychiatric Press; 2000. p 601–3.

18. SPSS 10.0. Chicago (IL): SPSS Inc; 1999.

19. Smith RG. The epidemiology and treatment of depression when it coexists with somatoform disorders, somatization or depression. Gen Hosp Psychiatry 1992;14:265–72.

20. Brown GK. A causal analysis of chronic pain and depression. J Abnorm Psychol 1990; 99:127–37.

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Résumé : La qualité du sommeil chez les patients aux douleurs chroniques

Objectif : Les patients aux douleurs chroniques se plaignent d'un sommeil de mauvaise qualité. La recherche visant à déterminer les prédicteurs d'un mauvais sommeil a produit des résultats contradictoires. L'humeur dépressive et la gravité de la douleur sont les prédicteurs les plus fréquents. Cette étude visait à déterminer si les patients aux douleurs chroniques différaient des sujets témoins en santé qui n'avaient pas de douleur aux mesures subjectives de la qualité du sommeil, et le cas échéant, quels facteurs contribuaient le plus à la mauvaise qualité du sommeil.

Méthode : Nous avons comparé les mesures de la qualité du sommeil, de l'anxiété et de la dépression de 40 patients aux douleurs chroniques qui satisfaisaient aux critères d'inclusion avec celles de 40 sujets témoins en santé. Les prédicteurs de la qualité du sommeil ont été étudiés à l'aide de la régression multiple dans le groupe souffrant de douleurs.

Résultats : Les patients aux douleurs chroniques avaient des scores plus élevés que les sujets témoins en santé à l'échelle d'anxiété de Beck, à l'inventaire de dépression de Beck (IDB) et à l'indice de la qualité du sommeil de Pittsburgh (PSQI). Au niveau bidimensionnel, la dépression s'est révélée le seul facteur significatif en corrélation avec la qualité du sommeil, et le modèle expliquait 34 % de la variance.

Conclusions : Les patients aux douleurs chroniques souffrent d'une mauvaise qualité de sommeil qui est fonction d'une humeur dépressive plutôt que de l'intensité de la douleur, de la durée ou de l'anxiété. Toutefois, il est difficile d'établir une relation causale dans cet échantillon de taille relativement modeste. En outre, l'échantillon de l'étude comprenait une population plutôt psychiatrique qui ne représente peut-être pas le groupe général de patients aux douleurs chroniques.