Original Article

Mood State and Quality of Sleep in Cancer Pain Patients: A Comparison to Chronic Daily Headache

Ruenn-Ching Wang, MS, RN, Shuu-Jiun Wang, MD, Yue-Cune Chang, PhD, and Chia-Chin Lin, PhD, RN

Graduate Institute of Nursing (R.-C.W., C.-C.L.), Taipei Medical University, Taipei; Hung Kuang University (R.-C.W.), Taichung; Department of Neurology (S.-J.W.), Taipei Veterans General Hospital, National Yang-Ming University School of Medicine, Taipei; and Department of Mathematics (Y.-C.C.), Tamkang University, Tamsui, Taiwan

Abstract

Cancer pain is commonly believed to be a unique type of pain and dissimilar to noncancer pain; however, only limited research efforts have been directed at examining this belief. The aim of this study was to explore whether patients with chronic daily headache (CDH) and patients with chronic cancer pain (CCP) present with different pain, mood, and sleep quality profiles. Forty-seven patients diagnosed with CDH were matched by age and gender with 47 patients with CCP. The research instruments included the Brief Pain Inventory-Chinese version, the Profile of Mood States Short Form, and the Pittsburgh Sleep Quality Index-Taiwan Form (PSQI-T). Results revealed that there was no difference in pain intensity between the patients with CDH and those with CCP; however, the CCP group reported significantly higher mean levels of pain interference with daily life than did the CDH group. These two groups did not differ on the Total Mood Disturbance score; however, the CCP group reported significantly lower mean levels of vigor than did the CDH group. Moreover, there was no difference on the PSQI-T total score between these two groups; however, the CDH group reported higher mean scores of sleep disturbance, higher mean scores of use of sleep medications, lower mean scores of sleep efficiency, and lower mean scores of daytime dysfunction than did the CCP group. Despite some differences between these two groups, pain, mood, and sleep quality profiles in these two types of pain groups are similar. J Pain Symptom Manage 2007;33:32–39. © *2007 U.S. Cancer Pain Relief Committee. Published by Elsevier Inc. All rights reserved.*

Key Words

Noncancer pain, chronic daily headache, cancer pain, sleep, mood disturbance

Introduction

Pain associated with cancer is commonly believed to be unique and dissimilar to noncancer pain. Cancer pain has typically been regarded as exclusively a biomedical problem requiring physical interventions.[1] The dichotomy between cancer pain and

Address reprint requests to: Chia-Chin Lin, PhD, Graduate Institute of Nursing, Taipei Medical University, 20 Wu-Hsing Street, Taipei, Taiwan, ROC. E-mail: clin@tmu.edu.tw

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noncancer pain implies that these two categories of pain differ in etiology, create different responses in patients, and require different management strategies.[2] Research efforts directed at examining this common belief are limited. The aim of this study was to explore the difference between cancer pain and noncancer pain in terms of patient pain, mood, and sleep disturbance profiles using chronic daily headache (CDH) as an example of noncancer pain.

Consistent with the fact that cancer is the leading cause of death in Taiwan, the government has directed attention to chronic cancer pain (CCP) rather than to other types of pain, such as CDH. The government of Taiwan[3] has published a national guideline on management of cancer pain, and the World Health Organization (WHO) has likewise given attention to cancer pain by releasing the WHO guidelines for cancer pain relief.[4] Little attention has been directed toward the study of noncancer pain.

Cancer pain and noncancer pain are assumed to be dissimilar because the disease outcomes differ so greatly. However, similarities do exist. CCP, like CDH, occurs daily or near daily for a prolonged period of time[5,6] and thus has a great impact on patient quality of life.[7] In addition, mood and sleep disturbance are common distressing symptoms for patients with CCP as well as those with CDH.[8–17] For example, studies have found that CCP has a great impact on patients' mood state and emotional distress[7–10] and on quality of sleep and sleep disturbance.[12,13] Similarly, researchers have reported that CDH usually is accompanied by mood disturbances[14,15] and sleep disturbances.[16,17]

Some important studies[18,19] have explored the assumption that cancer pain is unique and dissimilar to noncancer pain. Lin[18] found that cancer pain patients and low back pain patients shared very similar pain experiences and used similar pain coping strategies. In another study, Turk et al.[19] found that reported pain intensity levels of cancer patients were comparable to those of patients with noncancer pain, and that the response patterns of both groups were highly comparable. Therefore, findings from these few studies do not support the common belief that cancer pain is unique and dissimilar to noncancer pain in its severity or in patients' responses. More research is needed to explore the differences between cancer pain and noncancer pain.

Materials and Methods

Participants and Settings

This study was conducted at headache clinics and outpatient oncology clinics of two medical centers in Taiwan. A consecutive sample was recruited for this study consisting of outpatients with CDH or CCP. To be included in the CDH group, patients had to a) be over the age of 18, b) have a headache frequency >15 days/month and duration >4 h/day if untreated,[20] c) have been experiencing headache for more than a month, with the worst pain intensity being greater than 3 (on a 0–10 scale) in the past week, d) be able to communicate in Chinese or Taiwanese, e) not currently be diagnosed with cancer, and f) be currently receiving no treatment with steroids. To be included in the CCP group, patients had to a) be over the age of 18, b) have been diagnosed to have advanced cancer (Stage III or Stage IV), c) have been experiencing cancer pain for more than a month, with the worst pain intensity being greater than 3 in the past week, d) be able to communicate in Mandarin or Taiwanese, e) have received no radiotherapy, chemotherapy, or surgery in the past month, f) have experienced no headache in the past week, and g) be currently receiving no treatment with steroids.

A pilot study with 20 CCP patients and 20 CDH patients was carried out to examine the feasibility of this formal study. In the pilot study, significant differences in age and gender were found between the CDH group and the CCP group. No other demographic variables were found to be different between these two groups. For the study, 47 CDH patients were matched by age and gender with 47 CCP patients.

Instruments

Brief Pain Inventory-Chinese Version (BPI-C). The BPI-C[21] was used in this study to assess the multidimensional nature of pain, including intensity and subsequent interference with life activities in the preceding 24 hours. In order to be consistent with other measures

in this study, the time frame for the BPI-C was the previous week. The first part of the Brief Pain Inventory (BPI) consists of four single-item measures of pain intensity: worst pain, least pain, average pain, and pain now. Each item is rated from 0 (no pain) to 10 (the worst pain I can imagine). The composite of the pain intensity score (i.e., the average of worst pain, least pain, average pain, and pain now) was computed to represent patients' overall pain intensity.[21] The second part of the BPI consists of seven items that assess the extent to which pain interferes with general activity, mood, walking, working, relations with others, sleeping, and enjoyment of life. Each item is rated on a 0−10-point scale. An interference score was computed, which was the average of the seven items. The reliability and validity of the BPI-C in a Taiwanese sample with cancer pain has been demonstrated.[22] In this study, the internal consistency for the pain intensity (worst pain, least pain, average pain, and pain now) was 0.77 for the chronic headache group and 0.82 for the cancer pain group. The internal consistency for pain interference was 0.85 for the chronic headache group and 0.77 for the CCP group.

Patients could report the quality of the pain by choosing from a list of 10 types of pain descriptions (e.g., twitching pain, dull pain, distension pain) at the end of the BPI-C.

Profile of Mood States (POMS) Short Form. The POMS short form[23] was used to assess the patient mood states in this study. The POMS short form consists of 30 items (based on the 65-item questionnaire in the long form) and contains the same six scales measured by the long form. The POMS measures tension, depression, anger, fatigue, confusion, and vigor. A composite score, total mood disturbance, is computed by taking a summation each of the individual scores for tension, depression, anxiety, fatigue, and confusion, and subtracting vigor scores to indicate patients' total mood disturbance. Each item of the POMS short form is scored on a five-point Likert scale ranging from 0 (not at all) to 4 (extremely). The reliabilities (Cronbach's α) ranged from 0.75 to 0.95 for an outpatient sample.[23] The POMS was translated into Chinese and the reliability and validity of the Chinese version have been supported in a sample of 233 Taiwanese patients with cancer pain.[11] In this study, reliability (Cronbach's α) for the POMS subscales ranged from 0.67 to 0.90 for the CDH group and from 0.64 to 0.88 for the CCP group.

Pittsburgh Sleep Quality Index-Taiwan Form (PSQI-T). This study used the PSQI-T, which was translated from the Pittsburgh Sleep Quality Index (PSQI)[24] by a translation and back-translation approach, to assess patients' sleep quality. The PSQI is a 19-item self-report questionnaire that indicates sleep quality and disturbances during the past month. In order to be consistent with other measures in this study, the PSQI was modified to ask questions about sleep in the previous week. The 19 individual items were used to generate the following seven component scores: subjective sleep quality, sleep latency (length of time between going to bed and the onset of sleep), sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. In all cases, a score of 0 indicates no difficulty, while a score of 3 indicates severe difficulty. The sum of the seven components of the PSQI is one global score that was validated with healthy and ill adults using polysomnography. The seven component scores have a reported overall reliability coefficient (Cronbach's alpha) of 0.83.[24] A global PSQI score >5 yielded a diagnostic sensitivity of 90% and specificity of 87% (kappa $= 0.75$, $P < 0.001$) in distinguishing good and poor sleepers.[24] Carpenter and Andrykowski[25] suggest a cutoff score of 8 for indicating poor sleep quality for a cancer population. Therefore, in this study the cutoff point of 8 was used as a criterion for indicating poor sleep quality. In this study, the Cronbach's α was 0.82 for the CDH group and 0.83 for the cancer pain group. A panel of experts established the content validity. The reliability and validity of the PSQI-T have been supported in the current study.

Procedure

This study used a cross-sectional design. Approval for this study was obtained from the Human Subject Committee of the hospitals involved. Patients who met the selection criteria were approached individually at the clinic by the research assistant who described the study and obtained oral consent. Patients

were given a questionnaire that they were asked to fill out independently, with no assistance from others. If a patient was unable to complete the questionnaire on his/her own, the research assistant read questionnaire items to each patient and recorded the answers.

Statistical Analysis

Descriptive statistics were used to describe the sample characteristics in terms of demographic and disease-related variables. Chi-square or *t*-tests were used to examine differences between patient characteristics and characteristics of CDH vs. cancer pain. The Mann-Whitney *U* test was used to examine the differences of pain intensity, mood states, and sleep quality between patients with CDH and patients with CCP. When the type I error was set at 0.05 and a medium effect size was expected, the sample power was 0.67 with 47 patients in each group.

Results

Patient Demographics

A total of 47 CDH outpatients matched with 47 CCP outpatients ($n = 94$) participated in this study. Table 1 presents the demographic and pain profiles of study participants. Patients with CDH had significantly higher levels of education than did patients with CCP. Patients with CDH reported significantly longer duration of diagnosis and experience of pain but fewer numbers of days in pain per month than patients with CCP. Diagnoses in the subtypes of CDH included chronic migraine ($n = 7$), chronic tension-type headache ($n = 16$), other CDH ($n = 1$), and medication overuse headache ($n = 23$). Cancer sites in patients with CCP included lung ($n = 14$), nasopharyngeal ($n = 9$), cervical/ovary ($n = 8$), breast ($n = 7$), liver ($n = 2$), lymphoma ($n = 2$), and various other types ($n = 5$).

Pain Intensity and Pain Interference with Daily Life

Differences in pain intensity and pain interference between the CDH group and cancer pain group were examined by Mann-Whitney *U* test because the normality assumption was not met for these two measures. As presented in Table 2, there were no significant differences in pain intensity (i.e., worst, least, average, and no pain) between the CDH or cancer pain groups. However, patients with cancer pain reported significantly higher mean levels of interference with general activity, walking, and work than did patients with CDH. The words that CDH patients used most frequently to describe pain quality were twitching pain (33%), dull pain (23%),

Table 1
Characteristics of CDH ($n = 47$) and CCP Patients ($n = 47$)

Characteristics	Cancer Pain, Mean (SD)	Headache, Mean (SD)	*t*	*P*-value
Age	54.57 (14.48)	53.53 (14.49)	−0.35	0.73
Education (years)	7.74 (4.90)	9.85 (4.36)	2.20	0.03[a]
Time of diagnosis (months)	26.30 (28.14)	61.57 (90.39)	2.56	0.01[a]
Duration of pain (months)	6.45 (10.27)	173.09 (159.87)	7.13	0.00[a]
Average days of pain per month	28.13 (4.99)	25.45 (6.46)	−2.25	0.03[a]
	n (%)	*n* (%)	χ^2	*P*-value
Gender			0.00	1.00
Male	14 (29.8)	14 (29.8)		
Female	33 (70.2)	33 (70.4)		
Marital status			0.05	0.50
Married	33 (70.2)	32 (68.1)		
Other	14 (29.8)	15 (31.9)		
Employment			1.30	0.36
Yes	36 (76.6)	31 (66)		
No	11 (23.4)	16 (34)		
Cancer stages				
Stage III	9 (20)			
Stage IV	38 (80)			

[a] $P < 0.05$.

Table 2
Pain Intensity and Pain Interference of Cancer Pain ($n = 47$) and CDH Patients ($n = 47$)

	Cancer Pain, Mean (SD)	Headache, Mean (SD)	95% Confidence Interval		Z	*P*-value
			Lower	Upper		
Pain intensity	4.05 (1.38)	4.32 (1.38)	−0.84	0.30	−1.01	0.31
Worst pain	6.49 (1.86)	6.40 (1.75)	−0.66	0.83	−0.28	0.78
Least pain	2.15 (1.47)	2.60 (1.73)	−1.10	0.21	−0.84	0.40
Average pain	4.34 (1.48)	4.79 (1.67)	−1.09	0.20	−1.76	0.08
Now pain	3.21 (2.01)	3.49 (2.02)	−1.10	0.55	−0.92	0.36
Pain interference	5.98 (1.94)	4.84 (2.17)	0.29	1.98	−2.21	0.03[a]
General activity	6.53 (2.53)	5.21 (2.92)	0.20	2.44	−2.19	0.03[a]
Mood	6.26 (2.51)	5.77 (2.97)	−0.64	1.62	−0.53	0.60
Walking	6.02 (3.00)	4.00 (2.90)	0.81	3.23	−3.25	0.001[a]
Work	7.11 (2.79)	4.66 (2.91)	1.28	3.61	−3.81	<0.001[a]
Relations with others	4.60 (3.59)	3.72 (2.44)	−0.39	2.13	−1.32	0.19
Sleep	6.32 (2.70)	6.17 (3.50)	−1.13	1.43	−0.19	0.85
Enjoyment of life	5.00 (3.71)	4.34 (3.16)	−0.75	2.07	−0.97	0.33

Note: Analyzed by Mann-Whitney *U* test.
[a]$P < 0.05$.

and distension pain (21%); the words CCP patients used most frequently to describe pain quality were twitching pain (28%), aching pain (26%), and dull pain (18%).

Mood States

Differences on mood states between the CDH group and cancer pain group were examined by the Mann-Whitney *U* test because the normality assumption was not met for this measure. As presented in Table 3, patients with cancer pain reported significantly lower mean levels of vigor than did patients with CDH. Otherwise, there were no significant mood state differences between these two groups.

Sleep Quality

Differences in sleep quality between the CDH group and cancer pain group were examined by Mann-Whitney *U* test because the normality assumption was not met for PSQI-T total score and subscale scores. In the CDH group, 83% of patients were identified as having poor sleep quality, and, identically, 83% of patients in the cancer pain group were likewise identified as having poor sleep quality. As presented in Table 4, there was no significant difference on the PSQI-T total score between these two groups. However, patients with CDH reported higher mean scores of sleep disturbance, more use of sleep medications, lower mean scores of sleep efficiency, and lower mean scores of daytime dysfunction than did patients with cancer pain.

Discussion

Despite differences in a few measures, patients with CCP and those with noncancer pain (represented by CDH in this study) presented similar pain experiences in terms of pain intensity, mood disturbance, and sleep quality. However, this study did not test the existential pain, which may be significantly

Table 3
Mood States of Cancer Pain ($n = 47$) and CDH Patients ($n = 47$)

	Cancer Pain, Mean (SD)	Headache, Mean (SD)	95% Confidence Interval		Z	*P*-value
			Lower	Upper		
Total mood disturbance	33.89 (14.33)	31.68 (20.85)	−5.15	9.49	−0.54	0.59
Tension	7.09 (3.30)	8.11 (4.81)	−2.71	0.67	−1.13	0.26
Depression	5.19 (3.30)	5.74 (4.55)	−2.18	1.07	−0.32	0.75
Anger	6.06 (4.32)	6.70 (4.92)	−2.53	1.26	−0.60	0.55
Vigor	2.83 (2.95)	5.74 (3.12)	−4.16	−1.67	−4.35	<0.001[a]
Fatigue	10.57 (4.15)	9.11 (5.12)	−0.44	3.38	−1.73	0.09
Confusion	7.81 (2.76)	7.77 (3.82)	−1.32	1.41	−0.29	0.78

Note: Analyzed by Mann-Whitney *U* test.
[a]$P < 0.05$.

Table 4
Sleep Quality of Cancer Pain ($n = 47$) and CDH Patients ($n = 47$)

	Cancer Pain, Mean (SD)	Headache, Mean (SD)	95% Confidence Interval		*Z*	*P*-value
			Lower	Upper		
PSQI-T total score	12.38 (4.59)	11.64 (4.35)	−1.09	2.58	−0.94	0.35
Subjective sleep quality	2.04 (.83)	1.89 (.76)	−0.18	0.48	−0.89	0.37
Sleep latency	2.06 (1.11)	1.81 (1.14)	−0.20	0.72	−1.16	0.25
Sleep duration	2.09 (.99)	1.89 (1.05)	−2.23	0.61	−0.92	0.36
Sleep efficiency	2.13 (1.17)	1.62 (1.23)	0.02	1.00	−2.15	0.03[a]
Sleep disturbances	0.98(.44)	1.30 (.55)	−0.52	−0.12	−3.02	0.003[a]
Use of sleep medication	0.83 (1.32)	1.62 (1.47)	−1.36	−0.21	−2.69	0.007[a]
Daytime dysfunction	2.26 (.87)	1.51 (.93)	0.38	1.11	−3.74	<0.001[a]

Note: Analyzed by Mann-Whitney *U* test.
[a] $P < 0.05$.

different in cancer patients. In this study, patients in both the CDH and CCP groups were experiencing mild to moderate levels of pain intensity. This finding is similar to the results of studies by Lin and Ward,[26] Holroyd et al.,[27] and Vazquez-Delgado et al.[28] Because cancer is a life-threatening disease, clinicians and researchers generally perceive that cancer pain is unique and dissimilar to noncancer pain. However, results from this study and from the study of Turk et al.[19] do not support the common assumption of the uniqueness of cancer pain.[1,18] The current study results are consistent with the hypothesis[2] that mechanisms between cancer pain and noncancer pain are not phenomenologically different.

In this study, patients with CCP experienced higher levels of pain interference with daily life than did patients with CDH. This result is similar to findings from the studies of Turk et al.[19] and Lin,[18] in which the patients with cancer pain reported significantly higher levels of perceived disability and inactivity due to pain than did those with pain from a nonmalignant origin. This study, consistent with that of Turk,[2] found that cancer pain and noncancer pain may differ in meaning and in co-occurring noxious symptoms, but not in the source of nociception, which may influence the perception of pain and subsequent responses. Moreover, the difference in disability and inactivity due to pain between CCP and CDH could also be related to burden of illness and comorbidity of cancer, especially given that most of the cancer patients in this study had Stage IV cancer.

This study showed that CCP patients were less vigorous than CDH patients, probably because cancer itself and cancer treatment may cause severe symptom distress and side effects, which in turn may lead to a decline in vigor. Spiegel et al.[29] discovered that in cancer patients, pain intensity was significantly related to fatigue, vigor, and total mood disturbance, while pain frequency was predominantly related to fatigue and vigor. Spierings and van Hoof[30] reported that 70% of chronic headache patients experienced fatigue. Furthermore, Peres et al.[31] reported that in patients with chronic migraine, 66.7% of the patients were also diagnosed with chronic fatigue syndrome.

Poor sleep quality was also noted in another study of chronic headache by Vazquez et al.[28] Sleep disturbance of cancer patients may occur at several periods: early diagnostic stage, final stage of cancer, periods of chemotherapy and radiotherapy, and periods of immunotherapy.[32] Jennum and Jensen[33] believed that there is a clear link between sleep and headache, especially since headaches often happen at night and dawn. However, they further stated that the mechanisms behind headache and sleep disturbance were complicated and needed further investigation.

In this study, CCP patients reported higher daytime dysfunction than did CDH patients. Owen et al.[34] found poor sleep quality and high incidence of daytime dysfunction in cancer patients. Daytime dysfunction of cancer patients may be caused by factors like cancer symptoms and side effects of treatment. David and Biondi[35] stated that headache patients often experienced headache at night and dawn and as a result of sleep deprivation. However, after patients had their sleep disturbance relieved through the use of medication, their headache symptoms improved greatly. This

study also revealed that patients with CDH had higher frequency of use of sleep medication than did chronic cancer patients. The difference in use of sleep medications in these two groups could be due to the different treatment strategy for cancer pain and headache. Moreover, this study discovered that CDH patients had higher levels of sleep disturbance than did CCP patients. CDH patients had higher frequency of awakening for toilet, feeling cold, and having nightmares than did CCP patients. Blau[36] believed continuous waking and breakage of normal sleep, which deprived patients of sleep, were reasons for headache.

In Taiwan and worldwide, cancer pain receives much more research attention than pain from noncancer sources due to the high mortality rate from cancer. Between 1992 and 1996, the Agency for Healthcare Research and Quality (AHRQ) in the United States sponsored development of a series of 19 clinical practice guidelines. One of the guidelines developed by the AHRQ, in both English and Spanish, is entitled "Management of Cancer Pain." No such guideline for chronic noncancer pain has been established and released. Again, cancer is a disease with a high fatality rate whereas chronic noncancer pain is not; however, results from this study show that the pain suffered by CDH patients is similar to that experienced by CCP patients and relief of this type of pain should, therefore, receive attention from the government and health professionals.

However, the results from this study should be interpreted with caution because of the following limitations: 1) In this study, patients with CDH were more highly educated than were patients with CCP. Also, patients with CDH experienced a shorter duration of pain than did CCP patients. The difference in educational levels and pain duration may influence patients' ability to cope with pain. Pain intensity and mood and sleep disturbances are only one component of suffering for patients with pain. Other components of suffering for patients with pain should be explored in future research; 2) It has been documented that there is a link between sleep disturbance and chronic headache.[36] However, the relationship between headache and sleep disturbance is complicated and not well-established, so interpretations of the relationship must be made with caution; and 3) The present study used nonrepresentative samples of the population; therefore, inferences should not be made to the general population. Generalizability of the study findings must be evaluated.

Results from this study provide important implications for further research and clinical practice. Cancer pain and noncancer pain may be different in ascribed pain meanings, pain beliefs, and co-occurring noxious symptoms, all of which may modify the experience of pain. More studies are needed to examine the role of pain meanings, pain beliefs, and other coexisting symptoms in pain experiences between cancer pain and noncancer pain groups. Although some differences exist, cancer pain and noncancer pain patients share similarities. Clinical approaches, both pharmacological and nonpharmacological, that work for managing cancer pain may have a potential to work for managing noncancer pain and vice versa. Finally, this study supports Turk's argument[2] that more rigorous efforts should be directed toward a new classification of pain according to relevant mechanisms. The traditional classification of pain into either cancer pain or noncancer pain does not seem to produce a beneficial impact on pain management.

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