Does Pain Relief Improve Pain Behavior and Mood in Chronic Pain Patients?

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Chronic pain is a subjective experience and has not only physical, but also psychological and social dimensions. In the present study, we sought to determine whether an effective pain reduction would improve mood, behavioral, and cognitive outcome measures in chronic pain patients. Four-hundred-seventy-seven patients entering pain therapy at our university pain center were prospectively studied during the first year of treatment. Patients received pharmacotherapy, acupuncture, transcutaneous nerve stimulation, physiotherapy, and invasive pain treatment. Intensity and quality of pain were assessed with the Visual Analog Scale and Multidimensional Pain Scale. Psychological and social aspects were evaluated using the Pain Behavior Questionnaire and the Profile of Mood States questionnaire. Significant reductions in pain intensity (Visual Analog Scale, 7.35 at pretreatment and 1.03 after 12 mo; $P = 0.01$; Multidimensional Pain Scale, $F = 6.185$; $P < 0.001$) were accompanied by improvements in behavioral and cognitive dimensions (Pain Behavior Questionnaire, $F = 9.483$; $P = 0.002$). However, mood and psychological well-being did not improve (Profile of Mood States, $F = 0.416$; $P = 0.551$). The authors conclude that reducing pain intensity improves behavioral and cognitive dimensions but not psychological well-being and cognitive assessment.

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Acute pain initiates protective physiological mechanisms in response to acute somatic injury. Acute pain is time-limited and does not induce persisting psychosocial or behavioral changes. In contrast, chronic pain is not necessarily caused by somatic tissue damage (2). Chronic pain induces changes in the peripheral and central nervous system that lead to a perpetuation of pain (3). Chronic pain affects cognitive and emotional dimensions, impairs mood and thinking, and involves individual awareness, abstraction, and appraisal of pain, along with a definition of pain based on personal attitudes and historical experiences (2,4–8). The change on the behavioral level becomes evident on the social level through pain-referential behavior, i.e., disturbances in social interactions. Furthermore, on the physiological somatic level, loss of mobility owing to pain and miscellaneous functional restrictions inhibits daily activities and work (2,6). These psychological and social adjustments may lead to a perpetuation of chronic pain (4). In brief, chronic pain may be defined as a condition in which pain, persisting for longer than 6 mo, causes significant alterations in the nervous system and impairs cognitive, social, and emotional behavior and leads to self-perpetuation of pain (9).

Cancer pain not only affects aspects of quality of life (10), but several studies have shown that pain itself is an important predictor for survival and progress of disease (10–12). The goal of chronic cancer and noncancer pain management is to improve not only physical conditions, but also pain behavior, social, and psychological aspects of the patient's life (2,10). The aim of the present study was to determine whether effective pain relief would improve psychological and social well-being in chronic pain patients. Quantitative assessment of subjective variables is difficult. In the present study, we used well established psychological tests to assess various aspects of pain including psychological and social dimensions. Patients entering pain therapy at our university outpatient pain center were repeatedly evaluated during the first year of treatment in a prospective observational study.

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Methods

Consecutive adult chronic pain patients entering pain therapy at our university outpatient pain center between October 1999 and May 2000 for the treatment of chronic noncancer or cancer pain were included in a prospective observational study. IRB approval and informed consent were obtained. Patients and their referring general practitioner received a questionnaire by mail assessing data on general and pain history before their first appointment at the outpatient pain center. Patients also received our study questionnaires and were informed that participation in the present study would require repeated evaluation after 1, 3, 6, and 12 mo. Study questionnaires were exchanged either during the appointment at the pain center or by mail. At the outpatient pain center, an anesthesiologist specializing in pain management surveyed the patient's medical history, pain history, and sociodemographic data. Social factors such as partnership and history of work were included. Clinical records were examined. History of primary psychiatric diseases, such as psychoses, substance abuse, and illegal use of opioids were exclusion criteria from further analysis. Pain analysis included the classification according to the International Association for the Study of Pain coding system. From a list of possible locations (head, abdomen, back, limb, neck, ear, throat, chest, and elsewhere), subjects were asked to indicate all locations where they had experienced pain within the previous 3 mo. In case of more than one location, participants were asked to refer to the worst pain. Precoded categories were used to assess the frequency of occurrence and the duration of pain episodes. Neuropathic pain is typically described as burning, lancinating, electrifying, and paroxysmal; nociceptive (somatic or visceral) pain is dull, aching, and cramp- or viselike. Pain therapy was individually designed by the anesthesiologist and was provided in accordance with an accepted program process of care. Patient care included one or several of the following components: non-opioid analgesic drugs, oral opioid treatment for cancer pain according to the recommendation of the World Health Organization (13), and oral opioid treatment for chronic noncancer pain in accordance with the American Pain Society-American Academy of Pain Medicine guidelines (14), as well as adjuvant drugs. Oral treatment was combined with adjuvant therapies such as acupuncture, transcutaneous electrical nerve stimulation (TENS), physiotherapy, and invasive treatment including nerve blocks, intrathecal pump implantation, and electrical spinal cord stimulation.

Pain intensity was assessed with the visual analog scale (VAS; 0 cm = no pain; 10 cm = the most intense pain imaginable) (15). Pain quality was assessed using the Multidimensional Pain Scale (MPS) based on the McGill Questionnaire of Melzack and Torgerson (16). The MPS describes four dimensions of pain perception as follows: (a) pain intensity, (b) the sensory-discriminative dimension reflecting the somatic aspect of pain, (c) the affective-motivational dimension, and (d) the total number of words describing the pain, the latter two reflecting the psychological involvement of the pain patient. The questionnaire was constructed as a self-judgment scale with a five-stage rating scheme, originally designed for the objectification of analgesic effects. The smaller the value of the MPS, the larger the pain perception and vice versa. The following scale raw values are calculated: pain intensity (0 = maximal pain; 10 = minimal pain), pain quality (rhythmic, lancinating, paroxysmal, general, extended, tiresome, stubborn, electrifying, chemical, and thermal pain; 0 = maximal pain; 12 = minimal pain). In the item analysis protocol, each item is listed according to scale affiliation with the respective answer of the test person. The MPS has been proven valid and reliable with a Cronbach's α-value between 0.83 and 0.93, respectively (16). Social aspects were evaluated by using the Pain Behavior Questionnaire (PBQ) (17). The questionnaire is a multidimensional instrument for assessing pain-related behavior and socially effective structures, which depend on the degree of closeness of the patients to their relatives. This questionnaire was developed for the diagnosis of patients with chronic pain illnesses. With four factorial, well-founded scales, the PBQ comprises subunits dealing with pain that correspond to training components in pain treatment concepts. The scales of avoidance (8 = minimal; 40 = maximal), activity (7 = minimal; 35 = maximal), and social support (8 = minimal; 30 = maximal) are based on the theory of operant pain learning, according to which pain behavior (pain-referential behavior, i.e., disturbances in social interactions, mobility loss owing to pain, and miscellaneous functional restrictions of daily activities and work) intensifies through negative reinforcement (termination of the aversive condition through retreat and depressive comorbidity). It can be improved through positive reinforcement (turning to significant reference people) and finally reduced through confrontation (continuation of activities). The last scale, cognitive control (8 = minimal; 40 = maximal) refers to self-taught skills of relaxation, imagination, and self-instruction that are evaluated. The test person answers a five-stage rating scale with the poles "doesn't apply at all" and "applies very much." The evaluation is based on sum values, which are calculated for the four scales. Furthermore, this test determines the relationship of pain patients with irrational attitudes, self-communication, and situates their physical and emotional reaction tendencies. The Cronbach's α-value of PBQ for avoidance, activity, social support, and cognitive control was 0.84 (17). Mood aspects were evaluated using the Profile of Mood States (POMS)

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questionnaire with Cronbach's α-values between 0.87 and 0.95 (18). The application of this self-judgment scale is suitable when momentary, shifting mood conditions are of importance. The test is constructed as a list of adjectives that the patient has to grade, and they are as follows: D = depression, dejection (depressive mood), inferiority, impotence, and despair (discouragement) (14 = minimal; 98 = maximal), T = tension and anxiety (7 = minimal; 49 = maximal), V = vigor and energy (activity, liveliness, and happiness) (7 = minimal; 49 = maximal), and A = anger, hostility, and sullenness (bad mood, irritation, fury, and aggression) (7 = minimal; 49 = maximal). The raw value is given for each scale as well as its percentage of the maximum value.

Data were tested for distribution by using the Kolmogorov-Smirnov test. Accordingly, statistical evaluation was executed either by means of nonparametric tests (Friedman test or Mann-Whitney *U*-test) or parametric tests (analysis of variance). Subgroup analysis (diagnosis groups or sex) was performed by using multivariate analysis of variance. A $P \leq 0.05$ was considered statistically significant.

Results

In total, 810 (502 women and 308 men) patients who were referred to the outpatient pain center between October 1999 and May 2000 received a written invitation to take part in the study. The study population reflected the typical Austrian population (white). Three-hundred-thirty-three (41%) patients were excluded because they were no willing to fill out the questionnaires (129; 15.9%) or because of premature dropout (204; 25%). Patients excluded from the study did not differ from the included patients with respect to socio-demographic data, medical history, and pain history. Consequently, 477 patients (316 women and 161 men) with a mean age of 54.4 ± 15.3 yr and 56.8 ± 14.4 yr, respectively, were included. Fifty-seven percent were married, 65% had one to four children, 27% had been home from work for more than 3 mo, and 18% had had no work for at least 1 yr. At 1-yr follow-up, 54% were still married, 19% of those on sick leave had returned to work, and 30% of the unemployed had found work. Patients had experienced pain for 4.3 ± 1.0 yr before the study (minimum, 8 mo; maximum, 16 yr). Thirty-eight percent of patients suffered primarily from nociceptive pain, 13% suffered primarily from neuropathic pain, and 39% had a combined nociceptive-neuropathic pain. Ten percent of the patients had a psychosomatic pain condition. Pain diagnoses were classified into 13 groups (Table 1).

Table 1. Pain Diagnoses

Subgroup	Diagnosis	Number of patients
1	Low back pain	121
2	Cervical syndrome	45
3	Thoracic pain	23
4	Neuralgia	55
5	Headache	67
6	Carcinoma	33
7	Fibromyalgia	24
8	Rheumatic pain	36
9	Thalamic pain	12
10	Arthritis and osteoporosis	36
11	Pain after amputation, phantom pain	16
12	Peripheral vascular disease	3
13	Chronic pelvic pain	6

Twenty percent of all patients were treated with non-opioid analgesics only (lornoxicam, paracetamol, diclofenac, and naproxen), 50% received non-opioid analgesics together with weak opioids (tramadol), and 13% received non-opioid analgesics together with strong opioids (morphine, oxycodone, and hydromorphone). Thirteen percent of patients with neuropathic pain received anticonvulsants (gabapentin, carbamazepine, and lamotrigine) or antidepressants (amitriptyline). In 4% of all patients, no pharmacotherapy was required. Forty-eight percent of all patients were referred to physiotherapy, both passive (hands-on) and active (e.g., training exercises), 33% underwent nerve blocks, and in 1% of patients, invasive treatment was indicated (intrathecal pump and spinal cord stimulation). Fifty percent of all patients were treated with TENS and 38% with acupuncture. Seventy percent of patients received more than one treatment modality. On average, it took the patients 20 min to fill in the paper-pencil study questionnaires. As summarized in Figure 1, pain intensity decreased significantly during the study period of 1 yr from VAS 7.41 ± 2.49 at baseline to VAS 1.03 ± 1.27 after the first year of therapy. We found no significant difference in pain evolution between chronic noncancer and cancer pain patients ($P < 0.837$), among the diagnosis subgroups, or between men and women. Together with the VAS reduction, a significant improvement in the MPS score was documented during the study period ($P < 0.01$) (Table 2). Subjectively, the quality (not intensity) of neuropathic pain remained unchanged, whereas nociceptive pain components improved significantly (Table 2). There were no differences in MPS scores between chronic noncancer pain and cancer pain patients ($P < 0.498$); however, the difference in improvement of nociceptive pain between men and women was statistically significant (men had a significantly better improvement in MPS; Table 2).

Figure 2, A and B show that the PBQ scores for avoidance behavior and cognitive control improved significantly during the study period ($P = 0.002$). We found no significant difference between chronic noncancer pain

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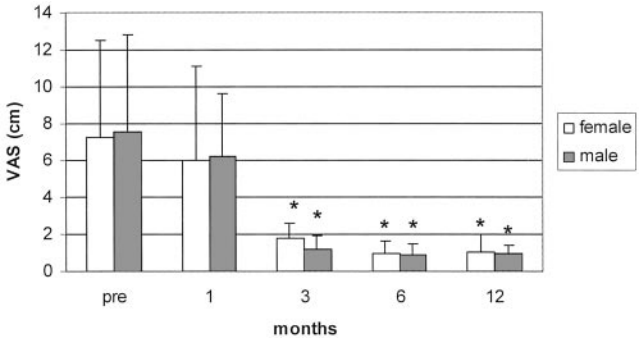

Figure 1. Pain intensity during the first year of treatment. Pain intensity decreased significantly during the first year of pain therapy including pharmacotherapy, transcutaneous electrical nerve stimulation (TENS), acupuncture, and invasive pain therapy but without psychological support. VAS = visual analog scale. Data are mean ± SD. *$P < 0.05$ versus pretreatment.

and cancer pain patients ($P < 0.446$; $P < 0.888$), between women and men, and between diagnosis groups. The PBQ score for social support did not change significantly over time neither in chronic noncancer or cancer pain patients ($P < 0.059$) nor in men and women. Similarly, the PBQ score for activity remained unchanged during the study period relative to sex (women, 19.55 ± 8.65; men, 19.48 ± 8.29; $P = 0.748$) and diagnosis groups. However, there was a significant difference between chronic noncancer and cancer pain patients for the variable activity ($P < 0.038$).

Among the diagnosis subgroups, the POMS variables of depression, tension, and vigor remained unchanged throughout the study period and revealed no statistically significant differences except with regard to sex (Table 3). The depression value was noticeably larger in women in the pretreatment group, whereas in the course of treatment, the POMS anger variable significantly increased in men ($P < 0.002$).

Patients receiving TENS did not differ significantly in pain intensity, psychological, and social outcome measurements when compared with patients not receiving TENS. Similarly, outcome in patients receiving acupuncture did not differ from that of patients receiving no acupuncture. We found no sex-related differences in the response to TENS or acupuncture and no differences between noncancer and cancer pain patients.

Discussion

We investigated behavioral and cognitive outcome measurements and mood in chronic pain patients who experienced significant pain relief during pain therapy at a university pain center (Fig. 1). Results presented in Figure 2, A and B demonstrate an improvement in behavioral and cognitive dimensions after significant reduction of pain intensity. However, psychological well-being and mood assessed by the POMS questionnaire were not improved (Table 3) despite the reduction in pain intensity.

To a certain extent our results are unexpected because one would anticipate that the elimination of somatic irritation and the resolution of social problems would reverse emotional and psychological discomfort. One explanation for our findings may be that the knowledge of the persisting underlying cause for symptomatic pain (e.g., carcinoma or incurable degenerative disease) undermines psychological well-being (8,9,19–21). The need for long-term pain therapy, chronic dependence on a medical institution, expenses for the treatment, and financial loss caused by sick-leave and unemployment may also have a long-lasting effect on the patient's well-being. We suggest that no improvement in psychological and social outcome measurements can be achieved as long as psychological therapy, such as individual therapy, relaxation therapy, or cognitive-behavioral therapy is not used. In this we agree with the results of previous studies (2,6,8,9,19–22).

Another reason for the failed psychological improvement after pain reduction may have been that the applied tests were inadequate for the assessment of psychological outcomes. However, POMS is a well-established test in psychological science for the evaluation of chronic pain patients (23–25). MPS has also proven to be a reliable measure of pain (23,26–28). PBQ has been proposed as an efficient, reliable, and valid measure of the sensory, affective, and behavioral aspects in pain experience (29,30). Nevertheless, all scoring systems, even the well-established VAS score, have their shortcomings (15). Among them, external subjective judgments of the examining doctor and missing precision have been accused of affecting the scores, especially during serial examinations. To minimize this bias on the pain status examination, grading should be based on multiple tests using suitable scoring instruments. The present study demonstrates that assessment of VAS score alone is not sufficient as a quality control for pain therapy because it does not permit detection of potential deficits in several aspects of the patient's quality of life. Improvement in social and emotional dimensions, not merely the reduction in VAS scores, should be the ultimate goal in the management of chronic pain patients (9).

Our study population suffered from negative mood conditions and feelings of depression, inferiority, impotence, despair, discouragement, tension, anxiety, anger, hostility, fury, irritation, and aggression throughout the study period. Liveliness, happiness, and activity were not regained during the course of somatic pain therapy (Table 3). Patients lessened their avoidance behavior during the observation period by operant pain learning: behavior was modified by negative reinforcement (avoidance of aversive conditions through retreat and

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Table 2. Multidimensional Pain Scale (MPS) Before and During 12 mo of Pain Treatment

	Measure	Lancinating pain	Paroxysmal pain	General pain	Stubborn pain	Electrifying pain	Chemical Pain	Thermal pain	Rhythmic pain	Tiresome pain	Extended pain
Women	Pretreatment	4.44 ± 3.92	3.90 ± 4.34	3.27 ± 3.76	4.73 ± 4.15	2.85 ± 3.48	1.96 ± 2.84	3.45 ± 3.84	3.21 ± 3.65	8.12 ± 5.48	3.94 ± 4.79
	1 mo	4.70 ± 3.73	4.92 ± 4.19	4.39 ± 3.59	5.75 ± 3.62	3.93 ± 3.62	3.25 ± 3.10	4.17 ± 3.79	3.95 ± 3.96	8.64 ± 4.73	4.90 ± 4.54
	3 mo	4.74 ± 4.28	4.67 ± 4.34	4.27 ± 3.83	5.61 ± 4.08	3.58 ± 3.66	3.42 ± 3.77	4.19 ± 4.13	4.39 ± 4.20	7.73 ± 5.22	4.93 ± 4.91
	6 mo	5.55 ± 4.41	5.11 ± 4.54	4.93 ± 4.13	6.45 ± 4.25	4.03 ± 3.87	3.95 ± 3.97	4.52 ± 4.07	4.59 ± 4.16	8.84 ± 5.16	5.04 ± 4.81
	12 mo	4.82 ± 4.09	4.44 ± 4.21	4.95 ± 4.06*	6.61 ± 6.44*	3.45 ± 3.26	3.15 ± 3.26*	3.97 ± 3.81	4.32 ± 4.24*	8.95 ± 5.21	5.01 ± 4.83
Men	Pretreatment	4.47 ± 4.08	4.04 ± 4.37	2.71 ± 3.59	3.84 ± 3.86	2.59 ± 3.38	1.72 ± 2.51	3.49 ± 4.09	2.20 ± 2.92	6.91 ± 5.39	2.55 ± 3.98
	1 mo	4.46 ± 4.21	4.14 ± 4.75	3.76 ± 3.33	4.53 ± 4.13	3.00 ± 4.11	2.08 ± 2.83	4.04 ± 4.45	3.14 ± 4.09	7.38 ± 4.92	3.02 ± 3.90
	3 mo	4.98 ± 4.19	5.19 ± 4.61	4.00 ± 3.23	5.61 ± 4.29	3.97 ± 3.80	3.17 ± 3.37	4.36 ± 4.12	3.96 ± 3.79	8.45 ± 5.10	3.84 ± 3.89
	6 mo	4.31 ± 3.87	5.05 ± 4.46	4.00 ± 3.11	5.29 ± 3.96	4.11 ± 3.77	3.00 ± 3.21	3.89 ± 3.52	3.71 ± 3.86	7.63 ± 4.67	3.23 ± 3.36
	12 mo	4.88 ± 4.20	6.02 ± 4.39*	5.07 ± 3.71*	6.86 ± 3.99*	4.86 ± 4.08*	3.62 ± 3.31*	5.19 ± 4.10	4.93 ± 4.57*	8.83 ± 5.68	4.93 ± 4.33*
Total	Pretreatment	4.46 ± 3.97	3.63 ± 4.22	3.07 ± 3.71	4.25 ± 4.03	1.58 ± 2.19	1.87 ± 1.72	3.35 ± 3.78	2.85 ± 3.44	7.70 ± 5.47	3.45 ± 4.56
	1 mo	4.61 ± 3.90	4.37 ± 4.14	4.16 ± 3.50	5.40 ± 3.76*	2.10 ± 2.33	2.81 ± 1.98	4.12 ± 3.91	3.65 ± 4.01	8.18 ± 4.82	4.21 ± 4.40
	3 mo	4.83 ± 4.24	4.89 ± 4.44	4.17 ± 3.61	5.61 ± 4.15	3.72 ± 3.71	3.33 ± 3.62	4.26 ± 4.11	4.23 ± 4.04	8.01 ± 5.17	4.51 ± 4.57
	6 mo	5.10 ± 4.25	5.09 ± 4.50	4.59 ± 3.82	6.03 ± 4.17	4.06 ± 3.83	3.61 ± 3.72	4.29 ± 3.88	4.27 ± 4.06	8.41 ± 5.01	4.39 ± 4.42
	12 mo	5.31 ± 4.14	5.08 ± 4.30	4.99 ± 3.91*	6.69 ± 5.63*	3.97 ± 2.46*	3.32 ± 2.31*	4.41 ± 3.95	4.55 ± 4.35*	8.91 ± 5.37	4.98 ± 4.63*
Statistics	F/P	$F_{0.988}$ $P < 0.413$	$F_{2.302}$ $P < 0.057$	$F_{6.680}$ $P < 0.001$	$F_{6.795}$ $P < 0.001$	$F_{4.442}$ $P < 0.001$	$F_{8.180}$ $P < 0.001$	$F_{1.821}$ $P < 0.123$	$F_{6.185}$ $P < 0.001$	$F_{1.323}$ $P < 0.260$	$F_{3.111}$ $P < 0.015$

Data are mean ± SD.
* $P < 0.05$ versus pretreatment data.

depressive comorbidity), by positive reinforcement (turning to significant reference people), and by confrontation (continuation of activities). Cognitive control also improved in the course of the study because of self-achieved coping mechanisms; an increase in skills of relaxation, imagination, and self-instruction was detected during psychological evaluation (PBQ). Factors that showed no significant improvement during the study were social support and activity, e.g., the relationships of patients to their families, friends, or caregivers, and social activities including return to work from sick leave and unemployment.

The present data show that whereas somatic aspects of pain can be controlled by conventional somatic pain therapy, psychological aspects cannot be cured. Even adjuvant acupuncture and TENS suggested for relaxation and harmonization did not improve psychological and social outcome measurements (31). These results confirm the need for interdisciplinary programs, which combine conventional pain care with psychological services, including individual therapy, relaxation therapy, or cognitive-behavioral therapy. For the chronic pain patient, training in accommodative pain-related coping strategies and flexible goal adjustment may prevent the feeling of loss and help to maintain a positive life perspective (1,32).

Cancer pain not only affects quality of life (10), but is also an important predictor of survival (10–12) and is considered to be a pathogen in itself that can facilitate the progression of disease. Although the condition of cancer pain patients may deteriorate, we found no statistically significant differences either in pain intensity, behavioral outcome measures, or mood between cancer and noncancer pain patients during the

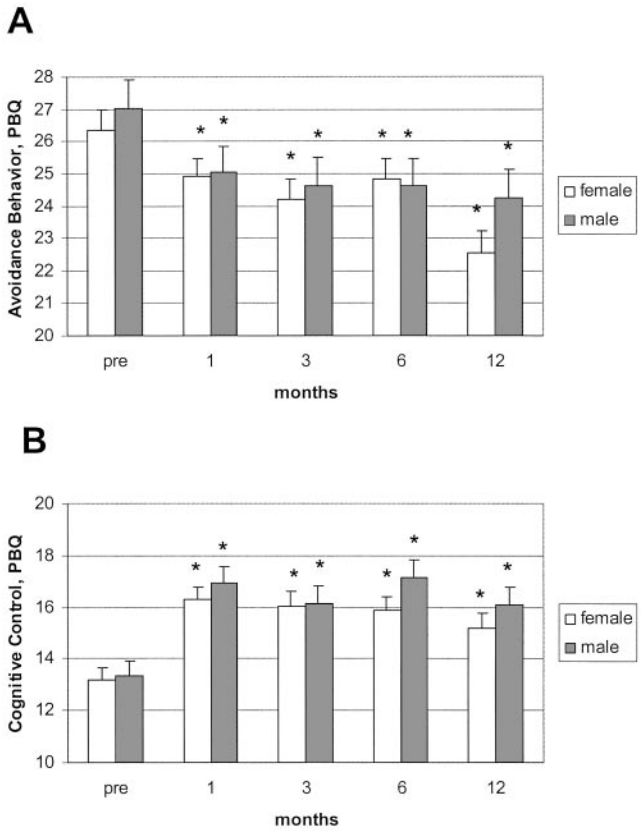

Figure 2. Social dimensions of pain during the first year of treatment. Avoidance behavior (A) and cognitive control (B) improved significantly during the first year of pain therapy including pharmacotherapy, transcutaneous electrical nerve stimulation (TENS), acupuncture, and invasive pain therapy but without psychological support. PBQ = Pain Behavior Questionnaire. Data are mean ± SEM. *$P < 0.05$ versus pretreatment.

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Table 3. Psychological Dimensions of Pain During the First Year of Treatment Assessed by the Profile of Mood States Questionnaire (POMS)

	Measure	Depression-dejection	Tension-anxiety	Vigor-energy	Anger-hostility
Women	Pretreatment	36.86 ± 24.22	24.10 ± 15.36	19.96 ± 10.79	16.12 ± 12.04
	1 mo	36.75 ± 21.98	24.67 ± 12.41	19.35 ± 10.78	18.04 ± 12.25
	3 mo	35.15 ± 25.56	22.97 ± 13.82	18.79 ± 12.27	17.90 ± 13.48
	6 mo	36.78 ± 24.82	23.95 ± 14.38	18.52 ± 11.84	17.46 ± 12.36
	12 mo	34.24 ± 28.21	21.82 ± 14.48	18.66 ± 11.72	17.24 ± 13.24
Men	Pretreatment	32.71 ± 23.97	22.77 ± 14.69	19.09 ± 11.76	18.13 ± 13.25
	1 mo	37.65 ± 24.59	22.12 ± 12.49	18.65 ± 12.38	19.41 ± 12.33
	3 mo	39.48 ± 24.43	24.58 ± 13.89	15.53 ± 10.20	20.28 ± 13.37
	6 mo	36.52 ± 23.85	23.36 ± 13.15	18.65 ± 12.45	18.91 ± 11.92
	12 mo	39.33 ± 23.35	24.23 ± 13.30	17.95 ± 10.81	21.07 ± 13.11*
Total	Pretreatment	35.39 ± 24.17	23.63 ± 15.11	19.00 ± 11.12	16.83 ± 12.49
	1 mo	37.08 ± 22.89	23.73 ± 12.45	19.09 ± 11.36	18.54 ± 12.25
	3 mo	36.80 ± 25.15	23.58 ± 13.82	17.55 ± 11.61	18.81 ± 13.45
	6 mo	36.69 ± 24.40	23.73 ± 13.91	18.56 ± 12.02	17.98 ± 12.18
	12 mo	36.10 ± 26.54	22.70 ± 14.06	18.40 ± 11.36	18.64 ± 13.26*
Statistic	F/*P*	$F_{0.416}$ $P = 0.551$	$F_{0.010}$ $P = 0.925$	$F_{1.671}$ $P = 0.257$	$F_{25.175}$ $P = 0.002$

Data are mean ± SD.
* $P < 0.05$ versus pretreatment.

observation period. This finding indicates that the underlying disease causing pain does not affect psychosocial dimensions during pain relief. Cancer patients had more social activity than noncancer pain patients; yet, the reason for this is not clear. Our results may indicate that a specialized social support, such as is present for many cancer patients, is also required in an interdisciplinary pain therapy setting.

Sex differences in the field of chronic pain are gaining more attention (33). Studies on sex-related variations in disability because of pain showed controversial results. Whereas some authors found comparable results between sexes (34), others reported a more frequent rate of disability in women (35), and others in men (36). We found sex-related differences particularly on the emotional level; in the initial evaluation, there were no detectable differences in the A-scale values (anger and hostility) between men and women; however, women scored noticeably higher than men on the D-scale (depression and dejection), which may increase the risk for chronicity of pain and less compliance. After 12 months of pain treatment (Table 3), men were significantly more angry, hostile, and sullen than women; whereas at the same time, the reduction of lancinating, thermal, and extended pain intensity was more pronounced in men than in women (Table 2). The subjective need for social support was more in women than in men, which may also increase the risk for chronicity of pain (37). Together, these findings indicate differing subjective pain nociception and perception in men and women with chronic pain, which are, at least in part, dependent on different social functions. Compared with men, women presented with more severe, more frequent, and longer duration of pain with more pain-related disability and health care resource use (38). Pain handicaps men in fulfilling their traditional part as a breadwinner (23,39). Accordingly, men are more sullen and angry about the handicap, but they are also eager to experience reversal of pain. The influence of sex on chronic pain in cancer and noncancer patients may be less important than that of psychosocial and behavioral responses (7).

Racial and cultural differences affect pain sensitivity (40). Although different cultures are represented in individuals of the white race, we found no significant differences in behavioral outcomes between Austrians of German, Serb, Bosnian, and Turkish origin. This may indicate that patients of different cultures similarly fail to feel an improvement of their psychological well-being in response to pain reduction.

One limitation of the present study design was the reliance on self-reporting by the patients. Another methodological shortcoming was that a homogenous study population was used. The authors conclude that reducing pain intensity improves behavior and cognitive dimensions but not psychological well-being and mood assessment.

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References

1. Soderlund A, Lindberg P. Long-term functional and psychological problems in whiplash associated disorders. Int J Rehabil Res 1999;22:77–84.
2. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. Pain 1992;50:133–49.
3. Martelli MF, Zasler ND, Mancini AM, MacMillan P. Psychological assessment and applications in impairment and disability evaluations. In: May RV MM, ed. Guide to functional capacity evaluation with impairment rating applications. Richmond, VA: NADEP Publications, 1999:1–84.
4. Hunfeld JAM, Perquin CW, Bertina W, et al. Stability of pain parameters and pain-related quality of life in adolescents with persistent pain: a three-year follow-up. Clin J Pain 2002;18: 99–106.
5. Padilla GV, Ferrell B, Grant MM, Rhiner M. Defining the content domain of quality of life for cancer patients with pain. Cancer Nurs 1990;13:108–15.
6. Turk DC. Perspectives of chronic pain: the role of psychological factors. Curr Direct Psychol Sci 1994;3:45–8.
7. Turk DC, Okifuji A. Does sex make a difference in the prescription of treatments and the adaptation to chronic pain by cancer and non-cancer patients? Pain 1999;82:139–48.
8. Turk DC. The role of psychological factors in chronic pain. Acta Anaesthesiol Scand 1999;43:885–8.
9. Gonzales VA, Martelli MF, Baker JM. Psychological assessment of persons with chronic pain. NeuroRehabilitation 2000;14: 69–83.
10. Ferrell BR, Grant MM, Funk BM, et al. Quality of life in breast cancer survivors: implications for developing support services. Oncol Nurs Forum 1998;25:887–95.
11. Herndon JE, Fleishman S, Kornblith AB, et al. Is quality of life predictive of the survival of patients with advanced nonsmall cell lung carcinoma? Cancer 1999;85:333–40.
12. Page GG, Ben-Eliyahu S. The immune-suppressive nature of pain. Semin Oncol Nurs 1997;13:10–5.
13. WHO. Cancer pain relief with a guide to opioid availability. Geneva: World Health Organization, 1996.
14. The use of opiods for treatment of chronic pain: a consensus statement from the American Academy of Pain Medicine and the American Pain Society. Clin J Pain 1997;13:6–8.
15. Mc Cormack HM, Horne DJ, Sheater S. Clinical applications of visual analogue scales: a critical review. Psychol Med 1988;8: 1007–19.
16. Lehrl J, Cziske R, Blaha L. Mehrdimensionale schmerzskala: multidimensional pain scale—schmerzmessung durch die mehrdimensionale schmerzskala MSS. In: Lehrl J CRBL, ed. Ebersberg: Vaterstetten Vless-Verlag, 1980:170–3.
17. Klages U. Fragebogen zum schmerzverhalten. Pain Behavior Questionnaire Diagnostica 1989;35:351–3.
18. McNair DM, Lorr M, Doppleman LF. EdITS manual for profile of mood states manual. In: McNair DM LMDL, ed. San Diego: Educational and Industrial Testing Service, 1971.
19. Morley SECWA. Systemic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain adults, excluding headache. Pain 1999;80:1–13.
20. Turk DC, Okifuji A. Psychological factors in chronic pain: evolution and revolution. J Consult Clin Psychol 2002;70:678–90.
21. Zaza C, Baine N. Cancer pain and psychosocial factors: a critical review of the literature. J Pain Symptom Manage 2002;24: 526–42.
22. Bech P. Health-related quality of life measurements in the assessment of pain clinic results. Acta Anaesthesiol Scand 1999; 43:893–6.
23. Affleck G, Tennen H, Keefe FJ, et al. Everyday life with osteoarthritis or rheumatoid arthritis: independent effects of disease and gender on daily pain, mood, and coping. Pain 1999;83: 601–9.
24. Boyle GJ, Ciccone VM. Relaxation alone and in combination with rational emotive therapy: effects on mood and pain. Pain Clinic 1994;7:253–65.
25. Von Gablenz E, Heinen B, Hesselbarth S, Lanz E. Differentiating between pain intensity and mood in chronic pain patients. Schmerz 1989;3:80–4.
26. Laudahn D, Walper A. Efficacy and tolerance of Harpagophytum extract LI 174 in patients with chronic non-radicular back pain. Phytother Res 2001;15:621–4.
27. Nilges P. Outcome measure in pain therapy. Baillieres Clin Anaesthesiol 1998;12:1–18.
28. Katz J, Melzack R. Measurements of pain. Surg Clin North Am 1999;79:231–52.
29. Feuerstein M. The pain behaviour scale: modification and validation for outpatient use. J Psychopath Behav Assess 1985;7: 301–15.
30. Gramling SE, Elliot TR. Efficient pain assessment in clinical settings. Behav Res Ther 1992;1:71–4.
31. Ezzo J, Berman B, Hadhazy VA, et al. Is acupuncture effective for the treatment of chronic pain: a systematic review. Pain 2000;86:217–25.
32. Williams DA, Keefe FJ. Pain beliefs and the use of cognitive-behavioral coping strategies. Pain 1991;46:185–90.
33. Berkeley K. Sex differences in pain. Behav Brain Sci 1997;20: 1–10.
34. Andersson HI, Ejlertsson G, Leden I, Rosenberg C. Chronic pain in a geographically defined general population: studies of differences in age, gender, social class, and pain localization. Clin J Pain 1993;9:174–82.
35. Makela M, Heliovaara M, Sievers K, et al. Musculoskeletal disorders as determinants of disability in Finns aged 30 years or more. J Clin Epidemiol 1993;46:549–59.
36. Strong J, Ashton R, Stewart A. Chronic low back pain: toward an integrated psychosocial assessment model. J Consult Clin Psychol 1994;62:1058–63.
37. Subramaniam V, Stewart MW, Smith JF. The development and impact of a chronic pain support group: a qualitative and quantitative study. J Pain Symptom Manage 1999;17:376–83.
38. Unruh AM. Gender variations in clinical pain experience. Pain 1996;65:123–67.
39. Fow-Neil R, Smith-Seemiller L. Impact of gender, compensation status and chronicity on treatment response in chronic pain patients. J Applied Rehab Counseling 2001;32:3–8.
40. Edwards CL, Fillingim RB, Keefe F. Race, ethnicity and pain. Pain 2001;94:133–7.

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