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Original Article

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Effect of Cognitive Pain Self-Management Program on Depression, Anxiety, and Stress in Women with Chronic Musculoskeletal Pain: A Pilot Study

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Abstract

Background: Chronic musculoskeletal pain is a worldwide health problem. Anxiety and depression are common among patients suffering from chronic pain. Self-management strategies are used to help patients manage the emotional distress associated with pain.

Aim: To evaluate the effects of cognitive pain self-management program (CPSMP) on depression, anxiety, and stress in women with chronic pain.

Method: This pilot study with a pretest-posttest design performed on 20 women with chronic pain, who were referred to Imam-Reza and Qaem Clinic Centers and Clinical Psychology Center of Ferdowsi University of Mashhad, Iran, during June-October 2014. The participants randomly assigned to experimental and control groups. The intervention comprised of eight 120-min weekly group sessions. CPSMP employs the principles of cognitive therapy and self-management program strategies. The control group received regular treatment sessions. At pre-and post-test, the participants completed Depression, Anxiety, and Stress Scale (DASS-21). The data were analyzed using Wilcoxon and Mann-Whitney U tests.

Results: The mean ages of the intervention and control groups were 35.2±9 and 32.5±11 years, respectively. After the intervention, Mann-Whitney U test did not reflect a significant difference between the intervention and control groups in terms of depression (P=0.14). Moreover, the results of Mann-Whitney test revealed a significant difference between the groups regarding anxiety (P<0.001) and stress (P=0.04).

Implications for Practice: CPSMP can be effective for reducing anxiety and stress in women with chronic pain**.** Further studies with larger sample sizes and more extended follow-ups are recommended.

Keywords: Chronic pain, Pain management program, Depression, Anxiety, Stress, Women

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Introduction

Pain is the chief complaint of patients receiving primary care and approximately 10-20% of primary care patients suffer from chronic pain (1). Chronic musculoskeletal pain is a common health issue that can have a negative impact on people's well-being and impose great costs on societies. It seems that the prevalence rate of chronic musculoskeletal pain among different populations ranges between 11% and 50% (2-5). Recent studies suggest that females report musculoskeletal pain more often than males (6).

Chronic pain patients often develop comorbidities such as depression and anxiety (7). Former studies suggested that depression is common among chronic pain patients.For instance, Bair et al. (2003) reported that the prevalence rate of pain in patients with depression ranged from 15% to 100%, while the prevalence rate of depression in patients suffering from pain ranged between 1.5% and 100% (8). Depression results in dysfunction and reduced health-related quality of life, and often more impairments are observed in patients with arthritis and lower-back pain (9).

Several studies have demonstrated that the prevalence rate of various anxiety disorders in people suffering from chronic pain ranged between 16.5% and 28.8% (10). Anxiety disorders often hinder occupational, social, and physical functioning. Pain overlaps with depression and anxiety symptoms in general medical inpatients (7). Traivedi (2004) argued that the link between pain and depression appears to have a shared neurologic pathway. He suggests that response to painful physical stimuli is moderated in the brain by serotonin and norepinephrine, which also affects mood. Patients with neurotransmitter dysregulation may have an imbalance of serotonin and norepinephrine, which may explain the association between painful physical symptoms and depression. When a patient with depression complains that he or she is feeling physical pain, there may be a chemical reason (11).

Even state-of-the-art pharmacological interventions diminished pain up to 35% in fewer than 50% of pain sufferers. As a result, psychological and social factors can influence and deteriorate pain (12). Although eliminating pain is unachievable, Inoue et al. (2014) argued that a multifaceted, comprehensive approach (e.g., a multidisciplinary therapeutic approach based on cognitive behavioral therapy [CBT]) can ameliorate pain (13).

Multidisciplinary CBT has been established for over 30 years, and there is some evidence supporting the effectiveness of multidisciplinary CBT (14-19). Lynch et al. (2011) indicates that "at present, it is desirable to combine psychological interventions with contributions of other professionals with appropriate pain training, particularly physicians, physiotherapists or physical therapists, exercise therapists, occupational therapists, and therapists with focus on vocational concerns" (P.200) (20).

Therefore, it is of pivotal importance to manage chronic musculoskeletal pain with effective, safe, and cost-effective approaches (21). CBT can be applied as an intervention for chronic pain, both alone and in combination with more traditional methods (14-17).

A broad spectrum of techniques appear to help patients suffering from pain, which are classified as self-management techniques (10). Information about elements of chronic pain aids chronic pain patients to become more involved in their condition and not rely on health professionals and medications to deal with their condition; thus, self-management training is more effective than individual therapy training (22). Evidence from studies conducted in the USA, Canada, the UK, Australia, and Iran demonstrate that low-cost community-based self-management programs, as an adjunct to usual care, are effective in improving health outcomes in individuals with chronic pain (23-28).

In a recent study, Inoue et al. (2014) investigated combination of cognitive behavioral therapy and exercise and suggested that this method should be recommended to patients with refractory chronic pain (29). In a study by Ikemoto et al. (2015), telephone consultation partially based on a cognitive-behavioral approach significantly reduced the intensity of pain and improved the quality of life in patients with chronic pain in Japan (30). Beissner et al. (2013) successfully adopted a group-based pain management program for implementation by health care providers in a home care setting. The process described here may be useful for other groups planning to implement evidence-based programs in new arenas (31).

Cognitive pain self-management program is developed by researchers and implemented in health care centers and uses principles of cognitive therapy and self-management strategies to ameliorate depression, anxiety, and stress in women with chronic pain, as prior studies indicate that cognitive-behavioral pain self-management programs are beneficial for patients with chronic pain (31-34).

In our study, a variant of self-management program was used through providing explicit instructions regarding CBT and self-management strategies (e.g., exercise and nutrition). In other words, exercise and nutrition were important features of this program. In self-management programs implemented in previous studies, teaching self-management strategies was emphasized. However, in the present study, not only novel self-management strategies were employed, but also identifying, evaluating, and modifying maladaptive beliefs were underscored.

Women with chronic pain, depression, and anxiety experience higher levels of pain, more functional limitations, more days "disabled" because of pain (7). Accordingly, cognitive self-management program can help these patients manage pain, the factors worsening pain, and distress related to pain. Therefore, in this study, we aimed to investigate the effectiveness of cognitive pain self-management program for women with chronic musculoskeletal pain.

Methods

This pilot study with a pretest-posttest design was conducted on 20 individual, aged 18-50 years old, experiencing chronic musculoskeletal pain for at least three months (the pain was radiologically and clinically diagnosed as chronic). The study was conducted in Imam Reza and Qaem Treatment Centers and Clinical Psychology and Counseling Center at Ferdowsi University of Mashhad, Iran, during June-October 2014.

The subjects were selected through convenience sampling, and they were assigned randomly to experimental and control groups (n=12). The treatment consisted of cognitive pain self-management program that comprised of eight 120-min weekly group sessions. Ultimately, four subjects did not complete the treatment program. Ten participants attended all the sessions in the intervention group. Therefore, the final sample size was 20 (n=10 in each group).

The inclusion criteria were 1) aged 18-50 years old, 2) chronic non-specific pain (i.e., lumbar, thoracic, or pan vertebral pain syndrome without serious spinal pathology or nerve root pain), 3) pain for at least three months, 4) ability to complete the self-assessment questionnaire, and 5) written, informed consent.

The exclusion criteria comprised of 1) unwillingness to participate; 2) severe somatic illness requiring specific treatment such as cancer, inflammatory rheumatic disease, neurological disease, and pain after a recent operation, 3) psychiatric disorders such as psychosis, and 4) use of stimulants, drugs, alcohol at the time of the study.

The data collection tools included a demographic and pain history variables form and the Depression Anxiety and Stress Scale (Dass-21). The demographic and pain history variables form entailed gender, age, marital status, educational level, and site of pain.

DASS-21 was designed to measure emotional distress under three domains of depression, anxiety, and stress (35). Dass-21 is the abbreviated, 21-item version of the original scale, which is divided into three subscales. It is a self-reporting questionnaire with 21 items (seven items for each category) rated using a 4-point Likert-type scale. The participants were asked to rate how much each item applied to them over the past week (ranging from 0= did not apply to me at all to 3= applied to me very much or most of the time). Higher scores in this scale indicate more intense emotional distress.

Seven items were associated with each sub-scale with score range of 0-21 for each subscale. Studies have reported good estimates of internal consistency reliability for the original scale scores (range= 0.82-0.97) of the DASS-21 in clinical and non-clinical samples (36-39). The concurrent validity of the DASS-21 scale scores was confirmed by moderate to high correlations (r= 0.40-0.65) with related measures of depression and anxiety (40, 41).

This questionnaire was first translated into Persian by Sahebi et al., (2004) and the validity and reliability of this scale were confirmed, which displayed satisfactory psychometric properties. The validity of DASS-21 was established using factor analysis and criterion validity (42). In this study, validity of DASS-21 was confirmed by 35 chronic pain patients in a pilot study. The Cronbach's alpha of DASS-21 was determined to be 0.93.

The participants were selected based on clinical judgment and were given brief information about the intervention. Each group consisted of ten participants. The intervention consisted of cognitive pain self-management through eight 120-min weekly group sessions with 10-minute breaks in each session. The control group received regular treatment sessions, and after the initial eight-week delay, the control group received the intervention, as well.

The interventional team included a Master's of Counseling, two clinical psychologists, a nutritionist, and a Physical Education and Sport Science specialist. The program was performed in the Clinical Psychology and Counseling Center at Ferdowsi University of Mashhad, Iran, and was conducted by a therapist (MSc), who was trained on the treatment protocol and received weekly supervision from two senior clinical psychologists. The participants received an appropriate diet and fitness program under supervision of a nutritionist and physical education and sport science specialist during eight weeks.
The treatment protocol consisted of cognitive therapy based on Michel Free (43) used in previous studies and the chronic disease self-management program (CDSMP) protocol originally developed by Lorig et al. (44). This treatment was a cognitive self-management program for chronic pain patients and was adopted especially for this study. Session-by-session outlines are presented in Table 1.

Table 1: Session outlines for cognitive self-management program

	Headlines	duration	Training method	Trainer
1	Introduction and ground rules, Teach ABC model, explain treatment program	Two hour sessions	Face to face; workshop	Two counseling masters
2	Identifying of automatic thoughts and logical errors, Boom and bust over\under Activity and Exercise, Breathing, Being more active, Goal setting and planning for action	Two hour sessions	Face to face; workshop; exercise booklet	Two counseling masters; sport science specialist
3	Welcome and reflections from last session, Identifying negative schema content using the vertical arrow method; give an overview of good nutrition and a rationale for eating better, Goal setting and planning for action	Two hour sessions	Face to face; workshop; consulting with a nutritionist	Two counseling masters; nutritionist
4	Welcome and reflections from last session, Making a master list of negative beliefs and cognitive maps, Using Mind to Manage Symptoms and Distraction, Goal setting and planning for action	Two hour sessions	Face to face; workshop	Two counseling masters
5	Welcome and reflections from last session , Beliefs that have changed, utility analysis, Investigatory Analysis, Muscle Relaxation, Goal setting and planning for action	Two hour sessions	Face to face; workshop exercise booklet	Two counseling masters; sport science specialist
6	Welcome and reflections from last session , Making counters, Hierarchy construction; Problem-Solving skill; Communication Skills, Goal setting and planning for action	Two hour sessions	Face to face; workshop	Two counseling masters
7	Welcome and reflections from last session , Changing negative beliefs; Depression Management, Guided Imagery, Goal setting and planning for action	Two hour sessions	Face to face; workshop	Two counseling masters
8	Welcome and reflections from last session , Self punishment, using imagery, review of the program, get feedback about the treatment plan	Two hour sessions	Face to face; workshop	Two counseling masters

All the participants recruited for the study received a verbal explanation about the study and were provided with a written information sheet. All the potential participants had at least 24 hours between receiving information and deciding whether they wished to enroll in the study. Written consent was obtained from all the participants.
To analyze the data, Chi-squared, Wilcoxon, and Mann-Whitney U tests were run using SPSS, version 21. All the assumptions for the parametric statistical analysis, including homogeneity of variance, were met. P-value less than 0.05 was considered statistically significant.

Results

Demographic data on the included participants are presented in Table 2. The mean ages of participants in the intervention and control groups were 31.2±10.1 and 32.5±11.1 years, respectively (P=0.73). Six (60%) of the participants in the intervention group and four (40%) of the participants in the control group were housewives; Fisher's exact test did not show a significant difference between the two groups in this regard (P=0.39). In terms of educational level, based on Chi-square test, four patients (40%) from the intervention group and six patients (60%) from the control group had university education; no significant differences were observed between the two groups (P=0.24; Table 2).
At baseline, mean scores of depression in the intervention and control groups were 22.8±9.6 and 17.2±9.4, respectively, and Mann-Whitney test reflected no significant differences between the groups

(P=0.21). After the intervention, the Mann-Whitney U test revealed no significant differences between the mean depression scores in the intervention (11±3.9) and control groups (19.0±9.3), while this score decreased in the intervention group (P=0.14).
However, comparison of mean depression scores within the groups using Wilcoxon test showed significant differences before and after the intervention in the intervention group (P=0.005).
According to our findings, mean anxiety scores in the intervention and control groups were 24.2±5.0 and 21.8±4.4 at baseline and 12.2±1.9 and 23.0±3.5 at the end of the study. The results of Mann-Whitney U test indicated that this value decreased significantly in the intervention group (P<0.001).
Mean stress scores in the intervention and control group were 23.8±4.7 and 21.8±6.2 at baseline and 17±4.6 and 22.8±6.4 at the end of the study, respectively. The results of Mann-Whitney U test indicated that this value significantly increased in the intervention group (P=0.04; Table 3).

Table 2: Demographic characteristic of participants

Characteristic	treatment (n = 10)	Control (n = 10)	Test result
Marital status, n (%)			
Single	2(20)	4(40)	**P=0.34
Married	8(80)	6(60)	
Education level completed, n (%)			
high school	3(30)	1(10)	
Diploma (12th grade)	3(30)	3(30)	** P =0.24
Bachelor's or higher	4(40)	6(60)	
Employment status, n (%)			
Employed	2(20)	4(40)	***P =0.39
Student	2(20)	2(20)	
Housewife	6(60)	4(40)	
Age(yr) (mean ±SD)	31.20 ±10.1	32.50±11.1	*P =0.73
Site of Chronic pain, n (%)			*** P =0.50
Head and Neck	1(10)	1(10)	
Back and leg	2(20)	1(10)	
More than one location	6(60)	8(80)	

*Mann-Whitney Test
** Chi Square test
*** Fisher's exact test

Table 3: Comparing depression, anxiety, and stress (mean ±SD) between and within groups

		Before mean ±SD	After mean ±SD	Comparison within groups Wilcoxon test
Depression	control	17.2 ±9.4	19 ±9.3	P=0.12
	intervention	22.8 ±9.6	11.0 ±3.9	P=0.005
Comparison Between groups Mann-Whitney Test		P=0.21	P=0.14	
Anxiety	control	21.8 ±4.4	23.0±3.5	P=0.30
	intervention	24.2±5.0	12.2 ±1.9	P=0.005
Comparison Between groups Mann-Whitney Test		P=0.28	P<0.001	
Stress	control	21.8 ±6.2	22.0 ±6.4	P=0.46
	intervention	23.8 ±4.7	17.0 ±4.6	P=0.005
Comparison Between groups Mann-Whitney Test		P=0.48	P=0.04	

Discussion

In the current study, we evaluated the impact of CSMP on depression, anxiety, and stress of women with chronic musculoskeletal pain. According to our findings, the difference between the intervention and control groups in terms of depression, anxiety, and stress was statistically significant. This study provides preliminary evidence on the effectiveness of cognitive self-management program and yielded superior results compared to an eight-week control condition.
In accordance with previous studies, this finding confirms the effect of cognitive pain self-management program on patients with chronic pain (31-34). Other self-management studies similarly found improvement in health status among patients with chronic pain. Some studies using different

variants of self-management program provided explicit instructions and exhibited beneficial effects of self-management program. A study by Turner-Stokes et al. (2003) showed that cognitive-behavioral pain management program made significant and sustained improvements on all outcome measures. In this treatment, the primary targeted psychological variables had improved following the program, and this change was generally maintained at 12 months (32).

In a study by Beissner et al. (2001) cognitive-behavioral pain self-management program was implemented. Their study demonstrated that implementing a CBPSM program for physical therapists treating patients with activity-limiting pain in the home care setting is feasible (31).

In this study, we demonstrated the efficacy of the cognitive pain self-management program in Iranian women. Furthermore, the results implied that self-management programs combined with cognitive therapy are beneficial for women with chronic pain.

The above-mentioned result can explain the reason behind employing cognitive pain self-management program and cognitive therapy techniques (e.g., making a master list of negative beliefs and cognitive maps, utility analysis, and investigatory analysis) and self-management strategies (e.g., using mind to manage symptoms and distraction and promoting problem-solving and communication skills). In fact, use of cognitive techniques helps patients to evaluate and modify maladaptive conceptualizations and dysfunctional beliefs about themselves. In other words, negative and unrealistic thoughts, images, and beliefs typically occur as a result of having chronic, unremitting pain. When patients think negatively, they are more likely to feel emotionally distressed, which can result in muscle tension, hyperarousal of the nervous system, activating more pain message in the body and leading to more pain (45). In cognitive therapy, patients learn to engage in more realistic thinking, especially if they consistently notice times when they tend to get caught up in catastrophic thinking (46). In addition, patients are taught to recognize the links between cognition, affect, and behavior along with their joint consequences (10).

Moreover, we applied self-management strategies that help patients to manage their pain, and especially psychological factors such as depression and anxiety. Before this program, many participants had conditions such as muscle tightness and shortening, caused by chronic pain. We incorporated exercises such as relaxation, stretching, muscle strengthening exercises, and balance training to be performed regularly at home. On the whole, this study shows that cognitive pain self-management programs probably have a beneficial effect on depression, anxiety, and stress for chronic musculoskeletal pain.

Results of meta-analyses indicate that self-management programs have a effect in reducing psychological factors. Our findings were congruent with the study by Inoue et al. (2014), who provided evidence that a combination of cognitive behavioral therapy and exercise should be recommended to patients with refractory chronic pain (29). Moreover, our results were in line with the findings of Stein and Miclescu (2013) suggesting that multidisciplinary rehabilitation treatment may lead to better coping with chronic non-cancer pain conditions with lower depression scores and higher social activity (47).

According to our results, cognitive pain self-management program can be considered as a multidisciplinary treatment as it incorporates specific individualistic exercises, self-management and cognitive techniques training, group therapy, and nutrition consultation. Therefore, implementing multidisciplinary programs for chronic pain patients seem to be reasonable and patients should be referred to adequately specialized institutions, instead of being referred to various individual medical specialists sequentially (48). We evaluated the efficacy of an eight-week cognitive pain self-management program for women with chronic pain. Significant improvements in depression, anxiety, and stress following the program suggest that the program could be effective.

The results of the present study provide preliminary evidence that a cognitive pain self-management program should be recommended to patients with chronic pain. In summary, this work may be particularly helpful for practicing physicians and psychologists in clinical settings in the treatment of chronic pain patients and also for researchers to design effective interventions.

This study suffers from some limitations including limited number of women with chronic pain, who were referred to targeted clinics and not accounting for the long-term effects of the program. Future studies are recommended to follow up patients over more extended periods of time and monitor cost-effectiveness of this program for both the individuals and the health care systems.

Implications for Practice

The results revealed that cognitive pain self-management program could be effective in diminishing anxiety and stress in women with chronic pain. Future studies should compare different methods and settings of cognitive pain self-management program and examine their association with chronic pain patients. In so doing, replication of this study on larger sample sizes with longer periods of follow-ups is recommended.

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Conflict of interest

The authors declare that there is no conflict of interest.

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