Original Article

J Babol Univ Med Sci
21; 2019. P:61-66

The Effectiveness of Cognitive – Behavioral Group Therapy On Pain Perception And Pain Severity Among Patients With Chronic Neuropathic Pain

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J Babol Univ Med Sci; 21; 2019; PP: 61-6

Received: Sep 1st 2018, Revised: Non 17th 2018, Accepted: Feb 3rd 2019.

ABSTRACT

BACKGROUND AND OBJECTIVE: The experience of pain consists of two sensory and emotional dimensions. The sensory dimension of pain indicates pain severity and the emotional dimension indicates pain perception. Since cognitive–behavioral therapy is an evidence-based treatment and emphasizes on the correction of dysfunctional thought processes and changing the maladaptive behaviors, this study was designed to investigate the effectiveness of cognitive – behavioral group therapy on pain perception and pain severity among patients with chronic neuropathic pain.

METHODS: This quasi-randomized trial was performed among 30 patients with chronic neuropathy referring to Rouhani Hospital in Babol in two groups of case and control (15 patients in each group). Cognitive – behavioral group therapy was performed in ten 120-minute sessions, held once a week for the experimental group. Participants were examined before the experiment and 45 days after the sessions, and the perception of pain was evaluated by the components of belief in pain permanence, self-blame, belief in pain constancy, mysteriousness of pain, and pain severity. The attainable score in The Pain Beliefs and Perceptions Inventory was 30 to -30, and in The West Haven-Yale Multidimensional Pain Inventory was 0 to 6.

FINDINGS: The results showed that there was a statistically significant difference between the two groups in the total score of pain perception (-8.87±7.40 vs. 1.6±93.30) (p=0.001), and the subscales of belief in pain permanence (-4.13±1.76 vs. 0.93±3.30) (p=0.04), belief in pain constancy (0.80±3.16 vs. -2.13±3.50) (p=0.04), mysteriousness of pain (-2.73±3.67 vs. 1.33±3.95) (p=0.003), and pain severity (2.19±1.28 vs. 3.64±1.27) (p=0.003).

CONCLUSION: The present study showed that cognitive–behavioral group therapy could be an effective intervention for reducing the pain perception and pain severity in patients with chronic neuropathic pain.

KEY WORDS: *Cognitive-Behavioral Group Therapy, Perception Of Pain, Pain Severity, Chronic Neuropathy.*

Please cite this article as follows:

Dehestani M, Mirzaian B, Saadat P. The Effectiveness of Cognitive – Behavioral Group Therapy On Pain Perception And Pain Severity Among Patients With Chronic Neuropathic Pain. J Babol Univ Med Sci. 2019;21:61-6.

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Introduction

Although pain is usually a transient experience, the pain lasts from the past for some people until it moves from an adaptive response to an acute injury and leads to emotional turmoil and increased use of resources in health care systems (1). Epidemiologic studies reported that one fifth of the European and American population are affected by chronic pain (2). Based on the studies conducted in Iran, it can be concluded that pain is a common phenomenon among the Iranian population and is a significant problem in this society (3). Pain is usually defined as a sensory and emotional experience that is associated with actual or potential tissue damage (1). Chronic pain is a pain that occurs every day or almost every day for at least 3 months within a six–month period. This pain may last from 3 months to 30 years (2).

New data showed that long-term pain is associated with functional and structural changes in the brain (4). Neuropathic pain is a neurodegenerative condition that is diagnosed by biopsy and neurological examination (5). Pain perception is a physiological response to pain that can be measured through sensory receptors, and becomes visible or invisible as a result of tissue damage, and is perceived as a pain in the central nervous system through the spinothalamic tract, thalamus, and finally in various regions of the cerebral cortex (6). Pain perception is the threshold of cognition or awareness of pain, but there are many variations and changes in pain perception among individuals or even in a person at different times. These variations can be interpreted based on the complexities in the mechanisms that cause pain and some psychological factors (7). The experience of pain consists of two sensory and emotional dimensions. The sensory dimension of pain indicates pain severity (2).

Cognitive – behavioral therapy (CBT) is based on the logic that the visible perception and manifestation of pain is affected by several interactions between environmental events and emotional, physiological, behavioral, and cognitive responses (8). Cognitive – behavioral therapy for chronic pain involves challenging the beliefs of patients and teaching them methods for a secure return to their enjoyable activities (1). Moss Morris et al. referred to the supporting role of cognitive–behavioral therapy in chronic fatigue syndrome and pointed to the importance of patients' perception of the disease in stabilizing the disorder (9). Hewlet et al. reported that cognitive – behavioral group therapy for self-control of fatigue in patients with rheumatoid arthritis improves the effects of fatigue, coping, perceived fatigue and well-being (10). Homzehpour Haghighi et al. in their research pointed to the significant effect of cognitive – behavioral therapy on the perception of disease and perception of pain (7). Kolivand et al. reported that cognitive – behavioral therapy is effective in reducing the severity of pain in patients with chronic pain (11).

Sadoughi et al. in their study indicated the effectiveness of cognitive – behavioral therapy in relieving chronic tension headache. In the study of Sadoughi et al., the mean pain severity was lower than that of the present study (12). Due to the fact that pain is considered as a physical problem in our country and the psychological outcomes of pain have been less considered and investigated and due to the high incidence and severity of pain in patients with chronic neuropathic pain, the effectiveness of other non-pharmacological interventions on the reduction of pain should be considered. We need to bear in mind that few studies have been conducted in this area in Iran. Cognitive–behavioral therapy is essentially a new intervention and is effective on many psychological problems according to several studies, and this quasi-experimental model is in fact among the widely used clinical projects. So far, the effects of meditation, relaxation training, etc. on pain relief have been studied. Fewer studies have been conducted regarding the effect of cognitive–behavioral therapy on pain among patients with chronic neuropathic pain.

Therefore, the present study was carried out using a cognitive – behavioral therapy (CBT) approach to evaluate the effect of cognitive – behavioral therapy intervention on pain perception and pain severity in patients with chronic neuropathic pain in Babol, northern Iran.

Methods

After obtaining the permissions from the ethics committee of Islamic Azad University of Sari with the code IR.IAU.SARI.REC.1396.73 and clinical trial registry code IRCT20180607040001N1, this quasi-experimental clinical trial was conducted among 30 patients with chronic neuropathy referring to Rouhani Hospital in Babol in 2017. According to Bieling et al., in cognitive – behavioral group therapy, the number of participants per group may range from 5 to 20 (13). In this study, 60 patients with chronic neuropathy were invited and 30 subjects were selected through purposive sampling and were randomly divided into two groups (15 subjects in the case group, and 15 subjects in the

control group). Patients were included in case of chronic neuropathic pain with the diagnosis of neurologist based on clinical examinations, electromyography, and spinal MRI (14, 15), lack of severe mental disorders (such as psychosis, bipolar disorder, personality disorder, etc.) and other physical illnesses, age range of 20 – 60 years, high school education and above, lack of participation in other educational and therapeutic classes simultaneously, and having informed consent. Patients were excluded in case of absence of more than two sessions, reluctance to continue their participation, severe psychiatric disorders, and physical illness and disabilities.

Before the beginning of the main sessions of treatment, a meeting was held for the case group and all essential rules were explained at this meeting. Cognitive – behavioral therapy was performed in ten 120-minute sessions (16) once a week for the case group in a private clinic by two people (a psychologist and one person with master's degree in clinical psychology) (Table 1). Participants were examined before the experiment and 45 days after the sessions. After the end of the treatment sessions, the case and control groups completed the pain perception and pain severity questionnaires (during the first follow up). Forty-five days after the end of treatment sessions, the case group and control group again completed the pain perception and pain severity questionnaires (during the second follow up).

The Pain Beliefs and Perceptions Inventory (PBPI) (Williams and Thorn, 1989): This is a 15-item questionnaire including four factors of belief in pain permanence, belief in pain constancy, self-blame, and mysteriousness of pain. The minimum and maximum attainable scores in this questionnaire are 30 to -30 (17). In the study of Asghari Moghaddam et al., the psychometric properties of The Pain Beliefs and Perceptions Inventory were confirmed among 232 patients with cancer pain (3). In the study of Williams et al., the reliability of The Pain Beliefs and Perceptions Inventory was confirmed in a population with chronic non-cancer pain (17). In the study of Nannally et al., the internal consistency reliability coefficients of the four factors of the questionnaire ranged from 0.70 to 0.77 (18).

The West Haven-Yale Multidimensional Pain Inventory (Kernes et al., 1985): This questionnaire consists of three parts that are independent of each other and measures 12 factors, and the subscale of pain severity is one of these factors. The minimum and maximum attainable score in the subscale of pain severity is from 0 to 6 (19). In the study of Kernes et al., the reliability of the 12 factors of this questionnaire was reported to be desirable (19). The internal consistency coefficients have been reported between 0.70 and 0.90 and test-retest coefficients ranged from 0.62 to 0.91. In the study of Nicholas et al., while validating the structure of five subscales in the first part of this questionnaire, reported the internal consistency coefficients of these subscales between 0.64 and 0.92 (15). In the study of Asghari Moghaddam et al., among 224 Iranian men with chronic pain, they confirmed the psychometric properties of the first part and the second part of the multidimensional pain inventory (3).

In the study of Nannally et al., among the Iranian population with chronic pain, the internal consistency coefficients of all subscales of the questionnaire (with the exception of the subscale of life control) ranged from 0.77 to 0.92 (18). Data were analyzed using Chi-square, independent t-test, Mann-Whitney test and ANOVA with repeated data. $P<0.05$ was considered significant.

Table 1. Cognitive – behavioral group therapy protocol (Thorn, 2005)

Brief summary of the sessions	Sessions
Relationship between stress - pain - assessment	First
Identifying Automatic Thoughts Introducing automatic thoughts and mental imagery	Second
Evaluation of Automatic Thoughts	Third
Challenging distorted negative thoughts Creating realistic alternative responses	Forth
Identifying the system of fundamental beliefs Challenging negative and distorted beliefs and creating new beliefs	Fifth
Intermediate and core beliefs related to pain Challenging negative and distorted beliefs associated with pain and creating new beliefs	Sixth
Build and apply positive coping strategies Introducing coping cards	Seventh
Learning and practicing emotional disclosure through writing	Eighth
Learning an encouraging relationship Planning an encouraging relationship	Ninth
Browsing the content of the thoughts and skills learned in this program Providing feedback on the effective and challenging aspects of treatment Planning to continue the exercises in everyday life	Tenth

Results

In this study, five patients (33.3%) had university education in the case group and three patients (20%) had university education in the control group. Three patients (20%) were employed in the case group and five patients (33.3%) were employed in the control group. The mean age in the experimental group was 43.8±20.32 and in the control group was 36.20±10.66 years. The mean duration of disease in the case group was 9.9±13.31 years and in the control group was 4.53±4.62 years. The variables of university education, occupation, age and duration of disease were not significantly different in the two groups (Table 2). In the analysis of the variable of pain severity over time in the studied groups using repeated measures analysis of variance, it was determined that for the variable of pain severity, the effect of the type of intervention had significant difference (p = 0.003, F = 10.21), indicating that cognitive – behavioral therapy results in a decrease in pain severity (Table 3). In the analysis of the variable of pain perception over time, the data were analyzed using repeated measures analysis of variance, and the effect of the type of intervention was significant (p=0.001, F = 13.35) for the variable of pain perception. In both groups, the level of pain perception decreased, but the decrease in pain perception in the case group was significantly higher in the first and second follow up in the two groups (Table 4). In examining the subscale of pain permanence, the effect of the type of intervention (p=0.44, F = 4.43) was significant, indicating significant decrease in pain permanence in the case group (Table 4). In the analysis of the subscale of self-blame, the effect of the type of intervention (p=0.78, F=0.07) did not show a significant effect, but there was a significant decrease in the case group (Table 4). In the analysis of pain constancy, the effect of the type of intervention was significant (p=0.04, F=4.57). In both groups, the pain constancy decreased, but the decrease in pain constancy in the case group was significantly more and differences were significant between the two groups in the first and second follow up (Table 4). In the analysis of the subscale of pain mysteriousness, the effect of the type of intervention was significant (p=0.003, F=10.71). The level of pain mysteriousness decreased in both groups. However, the reduction in the case group was significantly more and the difference was significant between the two groups in the first and second follow up (Table 4).

Table 2. Status of demographic and background characteristics of the subjects based on pain in control and case groups

Group / Variable	Control N(%)	Case N(%)	P-value
Education			
Below High school diploma	5(33.3)	3(20)	0.60 *
High school diploma	7(46.7)	7(46.7)	
University degree	3(20)	5(33.3)	
Job			
Unemployed	10(66.7)	12(80)	0.40 *
Employed	5(33.3)	3(20)	
	Mean±SD	**Mean±SD**	
Age (years)	36.20±10.66	43.20±8.32	0.06**
Duration of disease (years)	4.53±4.62	9.13±9.41	0.21***

*** Chi-square test, ** Independent t–test, *** Man – Whitney test**

Table 3. Comparison of mean pain severity over time in the studied groups

Group / Variable	Pain severity		
	Control Mean±SD	Case Mean±SD	P-value**
Before intervention	4.36±1.63	3.68±1.17a	0.20
First Follow up	3.64±1.27	2.19±1.28b	0.004
Second Follow up	3.55±0.97	1.95±1.27b	0.001
P-value *	0.08	<0.001	-

The same letters show lack of significance at 0.05 (Bonferroni test), * Repeated measures analysis of variance, ** Independent t-test

Table 4. Comparison of mean pain perception and its subscales over time in the studied groups

Variable	Group	Before intervention Mean±SD	First follow up Mean±SD	Second follow up Mean±SD	P-value *
Pain perception	Case	1.47±8.34 a	-8.87±7.40 b	-12.33±9.0 c	< 0.001
	Control	6.20±5.91 a	1.93±6.30 b	-1.87±5.59 c	< 0.001
P-value **		0.10	0.001	0.001	-
Pain permanence	Case	-1.27±2.81 a	-4.13±1.76 b	-4.60±2.50 b	< 0.001
	Control	-1.40±3.33	0.93±3.30	-1.73±3.47	0.55
P-value**		0.74	0.008	0.02	-
Self – blame	Case	1.73±3.19 a	0.13±3.37 b	-0.33±3.77 b	0.004
	Control	1.80±3.85	0.73±3.53	0.07±3.43	0.17
P-value**		0.62	0.65	0.80	-
Pain constancy	Case	0.47±4.43 a	-2.13±3.50 b	-2.80±3.68 b	< 0.001
	Control	2.47±3.13 a	0.80±3.16 ab	-0.53±3.18 c	< 0.001
P-value**		0.14	0.02	0.08	-
Pain mysteriousness	Case	0.53±3.99 a	-2.73±3.67 b	-4.60±3.56 c	< 0.001
	Control	3.33±3.01 a	1.33±3.95 b	0.47±3.79 b	0.001
P-value**		0.06	0.005	0.001	-

Similar letters in each row show lack of significance at 0.05 (Bonferroni test), * Repeated measures analysis of variance, ** Mann-Whitney test

Discussion

The results of this study showed that cognitive – behavioral therapy has a significant effect on pain perception and pain severity in patients with chronic neuropathic pain. This finding is consistent with the study of Otis et al., who stated that cognitive – behavioral therapy is an effective therapeutic approach for pain relief and intervention in painful diabetic peripheral neuropathy. In the study of Otis et al., the mean pain severity was higher than the present study (20). Heutink et al. showed that multidimensional cognitive–behavioral program was effective on patients with chronic neuropathic pain in spinal cord injury (21). Palermo et al. confirmed the efficacy and accessibility of cognitive – behavioral therapy through the Internet in reducing pain and improving the performance of children and teenagers with chronic pain (22). Janbozorgi et al. in a research stated that cognitive – behavioral therapy could minimize the harmful effects of pain and improve psychological distress (23).

Hamid et al. stated that cognitive – behavioral group therapy had a significant effect on pain relief and increased mental health of patients with chronic low back pain compared with control group. In the study of Hamid et al., the mean pain severity was greater than that of the present study (2).

Rahimian Boogar et al. reported that cognitive – behavioral group therapy is an effective way to reduce the multifaceted symptoms of pain in patients with chronic low back pain (24). Rafiee et al. stated in their research that cognitive – behavioral therapy is effective in reducing depression in patients, reducing the catastrophic pain, reducing pain severity and improving pain management strategies. In the study of Rafiee et al., the mean pain severity was higher than the present study (25). Abbasi et al. reported the effect of cognitive – behavioral therapy on the reduction of fatigue in patients with multiple sclerosis (26). With emphasis on active coping strategies (such as trying to perform tasks despite pain and lack of attention to pain, positive internal monologue), cognitive – behavioral therapy leads to a decrease in the severity of pain and increases tolerance (8). Therefore, it is acceptable that the components of pain perception and pain severity decrease through cognitive – behavioral therapy and the patient feels more comfortable and self-efficacious. Overall, the results of this study showed that cognitive–behavioral group therapy can reduce pain perception and pain severity in patients with chronic neuropathic pain and it is suggested that health professionals should use non-pharmacological treatment, including cognitive-behavioral therapy, in addition to pharmacological treatments for patients with chronic neuropathic pain. This study, like any other research, had some limitations such as limitations in external validity and the continuation of therapeutic interventions.

Acknowledgment

Hereby, we would like to thank all the professors who collaborated on this project, especially Dr. Khadijah Panahandeh and all participants who helped us with this research.

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