



Comparing the Effectiveness of Cognitive-behavioral Therapy and Dialectical Behavior Therapy on the Pain Metaphorical Perception in Patients with Chronic Pain

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ABSTRACT

Aims: This study was conducted to compare the effectiveness of cognitive-behavioral therapy and dialectical behavior therapy on the pain metaphorical perception in patients with chronic pain.

Method and Materials: The study method was semi-experimental with a pre-test-post-test design and control group. The population was all people with chronic pain in the first six months of 2024 in Tehran. Accordingly, 45 patients with chronic pain were selected voluntarily and randomly assigned to intervention and control groups (each group n=15). The Questionnaire of the study was Raiisi's Pain Metaphorical Perception. The first experimental group received eight sessions of 90-minute cognitive-behavioral therapy, but the second group received eight sessions of 90-minute dialectical behavior therapy. The control group did not receive any intervention. The data were analyzed using multivariate analysis of covariance by SPSS-26.

Findings: The results indicated that cognitive-behavioral therapy and dialectical behavior therapy significantly increased components of pain metaphorical perception (object, force, human, and causality) in patients with chronic pain ($P < 0.001$).

Conclusion: The findings of this research emphasized the effectiveness of cognitive-behavioral therapy and dialectical behavior therapy on the pain metaphorical perception. As a result, by changing the metaphors of pain in patients, the interpretation of pain can be changed.

Keywords: Pain metaphorical perception, Cognitive-behavioral therapy, Dialectical behavior therapy, Patients with chronic pain

Introduction

Chronic pain or chronic pain syndrome is a type of pain that is also known by other titles such as gradual burning pain, vague pain, throbbing pain, and nauseating pain [1]. In other words, chronic pain is pain that lasts longer than the expected period of recovery [2]. Chronic pain often includes cancer, post-traumatic or surgical, musculoskeletal, and visceral pain [3]. Chronic pain is often associated with psychological reactions, such as depression, poor self-efficacy, and feelings of helplessness [4]. One of the important dimensions of pain is its cognitive aspect [5]. On the other hand, what can represent the cognitive system at the verbal level are conceptual metaphors or cognitive metaphors [6]. Conceptual metaphors are based on the scientific approach to language and based on the theory of

Lakoff. Accordingly, conceptual metaphors have two basic components, source and target. Based on the source domain, the status of the destination domain (which is subjective and abstract) is determined [7]. Cognitive linguistics studies introduced a new nature for metaphors, based on which, metaphors are not just a figure of speech or one of the purely verbal features. Rather, they are considered to be an active process in terms of linguistic-verbal in the human cognitive system [8]. In this view, conceptual metaphors as useful tools play an important role in recognizing and understanding phenomena and affairs, and they create a cultural model in the mind, according to which the chain of behavior is planned [9]. Metaphoric thinking capacity expands on people's cognitive characteristics [10]. On top of that, pain is metaphorically expressed

due to its abstract nature [11]. Cognitive-behavioral therapy has emerged from the combination of two approaches, behavioral therapy and cognitive approach [12]. Due to the combination of these two components, it can be effective in chronic pain [13]. This approach uses terms and concepts that somehow make sense in the behavioral framework and are considered to be evaluated and measured. Cognitive-behavioral therapies include strategies that are designed to change the thinking, attitude, perception, and behavior of people [14]. In this approach, where cognitive and behavioral methods are used together, it is emphasized to identify false, negative, and irrational beliefs that affect people's emotions and behaviors and correct these underlying beliefs using cognitive and behavioral techniques [15]. According to Ellis's theory, emotional and psychological disorders are often the result of a person's illogical and irrational thinking, and if a person's rational thinking increases and irrational thinking decreases, it is possible to get rid of most mental disorders [16]. A study showed that due to the characteristic of visualization and attention change in cognitive-behavioral therapy, patients suffering from chronic pain were able to produce cognitive distortion in their perception of pain [17].

As a cognitive-behavioral therapy, dialectical behavior therapy offers coping mechanisms that allow patients to examine the negative aspects of their lives and finally separate from them [18]. From the perspective of dialectical behavior therapy, the difficulty in regulating painful emotions is the core of people's behavioral problems, and from an individual point of view, painful emotions are often problems that need to be solved [19]. In this treatment method, mindfulness and distress tolerance are the components of emotional acceptance and regulation, and interpersonal efficiency is the effective component of change in dialectical behavior therapy [20]. Due to the nature of emotional regulation of dialectical behavior therapy, this treatment can be effective in reducing pain [21]. A study showed that cognitive behavioral therapy has been effective in the acceptance of pain, acceptance

of disease conditions, and cognitive flexibility towards pain [22].

As mentioned, conceptual metaphors have a cognitive nature and constitute cognitive capacity. Pain is an abstract concept that requires the help of metaphors to express it. The metaphorical perception of pain is a new interdisciplinary variable that has recently entered the research literature, and since it is a cognitive concept, it seems that treatments that have cognitive components can be effective in changing and improving it. For this reason, there is no place for such studies in the research literature. Hence, the purpose of this study was to compare the effectiveness of cognitive-behavioral therapy and dialectical behavioral therapy on pain metaphorical perception in patients with chronic pain.

Method and Materials

The method of the study was semi-experimental with a pre-test-post-test design and a control group. The population was all people with chronic pain in the first six months of 2024 in Tehran. Accordingly, 45 patients with chronic pain were selected voluntarily and randomly assigned to intervention and control groups (each group n=15). In other words, based on Cohen's formula [23] and considering the first and second type error and the expected average difference in the study groups, 15 people were randomly assigned to each group. The control group did not receive any intervention. The entering criteria were; having one of the types of diseases with chronic pain (as Migraine, musculoskeletal pain, and visceral pain) for one year, aging between 30 to 55 years, and not receiving other psychological treatments during the study. Exiting criteria were; having more than one session absent during the treatment, declaration of non-satisfaction to continue cooperation due to the severity of the pain, and lack of appropriate cooperation. To carry out the research, the researcher, after coordinating with physical medicine and pain clinics in Tehran, asked clients who had chronic pain to participate in the present study if they wished. The questionnaire was completed before and after intervention by

two experimental and control groups. The researcher also committed to comply with the ethical principles, after the end of the research, this combination of interventions will also be conducted for the control group.

The used tools in this study were as follows: Demographic Information Questionnaire: This questionnaire was prepared to collect the individual information of the participants, including age, level of education, marital status, history, and type of disease.

Pain Metaphorical Perception Questionnaire: This questionnaire was designed by Raiisi [24] and has 25 questions. It has three subscales: object, force, human, and causality. The scoring of the questionnaire is in the form of a Likert scale (with the scoring method, 1 completely agree with 5 to completely disagree with 1). The minimum score obtained from the entire questionnaire is 25

and the maximum score is 125. The validity of the questionnaire was confirmed through content validity and experts' opinions using the Waltz and Bassel method. The whole questionnaire and its factors have good reliability with Cronbach's alpha coefficient method (0.75). Cronbach's alpha was object (0.73), force (0.76), human (0.72), and causality (0.77). Therefore, the results of the factor analysis showed that the metaphorical perception of pain questionnaire consists of four factors: object, force, human, and causality, which explain 24.66% of the total variance of the factors. In the present study, Cronbach's alpha coefficient on this scale was 0.89.

Cognitive-behavioral therapy (CBT): This therapy was performed on the first experimental group for 8 weeks, once a week for 90 minutes as a group.

Table 1) Cognitive-behavioral group therapy sessions according to Pawluk & McCabe [25]

Session	Target	Topic
1	Familiar with the rules of the group.	<ul style="list-style-type: none"> • Introducing each member and explaining group rules and regulations by the group. • Helping to understand the problems of the members. • Explanation about the method and method of treatment. • Examining the goals and expectations of the participants from the treatment. • Explanation of the logic of the treatment • Homework: Studying the self-help book (a guide to overcoming pain).
2	Correction of cognitive beliefs.	<ul style="list-style-type: none"> • Categorizing and identifying cognitive distortions and evaluating the degree of belief in pain distortion. • Teaching and examining the cognitive model of thinking, feeling, and behavior. • Providing explanations about the characteristics of negative spontaneous thoughts. • Introduction and identification of cognitive errors along with the degree of belief in it. • Homework: The sheet for completing the sheet for recording thoughts and reviewing cognitive distortions.
3	Getting to know and teaching cognitive strategies and using them (replacing negative thoughts with positive thoughts)	<ul style="list-style-type: none"> • Evidence review techniques training. • Investigating strategies to combat cognitive distortions. • Homework: Provide an evidence review exercise using a thought sheet.
4	Knowing and teaching cognitive strategies and using them.	<ul style="list-style-type: none"> • Strategies to combat cognitive distortions (Profit and loss technique). • Replace negative thoughts with positive thoughts. • Homework: Presenting the practice of examining profit and loss using the thought recording sheet.
5	Teaching social skills.	<ul style="list-style-type: none"> • Identify situations that provoke pain. • Training of mental and cognitive discomfort unit towards pain. • Teaching social skills and role-playing. • Homework: Providing a hierarchy of situations that aggravate pain along with the percentage of pain sensation.
6	Imaginal exposure training and role-playing.	<ul style="list-style-type: none"> • Imaginary and real exposure to pain. • Assertiveness and play a role during pain. • Homework: Practicing mental review of social skills and completing thought sheets.
7	Real exposure training.	<ul style="list-style-type: none"> • Roleplaying and real exposure in the meeting (attendance in the crowd and speech). • Learning coping techniques. • Homework: Practicing real exposure and completing thought sheets. • Teaching strategies to prevent the relapse of pain. • Summarizing the concepts reviewed in the previous sessions.
8	Overview of all sessions, homework review, and real exposure.	<ul style="list-style-type: none"> • Discussion and review of the effective factors and triggers for the return and recurrence of the disease. • Homework: Practicing and applying strategies to prevent the return and recurrence of pain caused by the disease.

Dialectic behavior therapy (DBT): This therapy was performed on the second experimental group for 8 weeks, once a week for 90 minutes as a group.

Table 2) Dialectic behavior therapy sessions according to Linehan, et al. [26]

Session	Target	Topic
1	Familiarity with teamwork and its regulations.	<ul style="list-style-type: none"> • Providing treatment logic and getting familiar with group work methods. • Conceptualization of the problem. • Agreement on treatment goals. • Agreement on the time and place of meetings. • Explanation of the logic of the treatment
2	Investigation of disruptive techniques.	<ul style="list-style-type: none"> • Discuss unpleasant events and experiences of pain and how they affect people's emotions. • Investigating how people judge their experiences. • Teaching observation and description skills. • Teaching the use of self-talk in the fundamental acceptance of pain. • Homework: Presenting a task to record the effect of using fundamental acceptance in the management of emotional disturbances.
3	Conscious attention and its effects in managing disturbances.	<ul style="list-style-type: none"> • Investigating thoughts and feelings and identifying external coping responses. • Examining methods of coping with emotional turmoil caused by pain, such as determining rest time, living in the present, affirmative self-talk, and new coping strategies. • Homework: Practicing awareness methods such as wise mind and intuition and recording its effects in controlling chaos.
4	Distress tolerance training.	<ul style="list-style-type: none"> • Examining the methods of reducing the effects of negative emotions such as increasing positive emotions, and acting against strong emotional desire. • Teaching the skills of persevering in crises, diverting the senses, and soothing yourself using the six senses. • Homework: Providing a task based on daily conscious attention and recording changes in disturbances.
5	Controlling impulsive behaviors.	<ul style="list-style-type: none"> • Teaching the technique of matching my desires with the desires of others and the ratio of desires and needs. • Identifying desires, adjusting the intensity of desires, and identifying self-destructive behaviors of pain. • Self-monitoring without judgment, reducing cognitive vulnerability, and increasing positive emotions. • Homework: Providing a task based on desires without judgment.
6	Emotion regulation training.	<ul style="list-style-type: none"> • The importance of emotions in pain management, recognizing emotions during pain, reducing vulnerability and emotional suffering, and increasing positive emotions during pain. • Changing emotions by acting opposite to the last emotion. • Homework: Providing a task based on emotion management.
7	Increase interpersonal efficiency.	<ul style="list-style-type: none"> • Maintaining and conserving the health of kinship relationships, and interest in pain management. • Teaching important personal skills in pain management (describing and expressing, expressing oneself and having assertiveness, and open trust). • Homework: Practicing assertiveness, and trust through tasks.
8	Examining and reviewing the past meetings and summarizing the lessons learned from the previous meetings.	<ul style="list-style-type: none"> • Examining the progress and amount of achieving the treatment goals. • Summarizing the concepts reviewed in the previous sessions. • implementing the post-test.

Findings

The mean and standard deviation of the age of the first experimental group was 42.17±7.09, the second experimental group was 41.89±6.99, and the control group was 40.93±7.01 years. The descriptive data and Shapiro-Wilk test are shown in Table 2. As the Shapiro-Wilk test (S-W) indicated; the distribution of scores in the three groups is normal. According to this table, Shapiro-Wilk statistics is not significant for all variables. Therefore, it can be concluded that the distribution of variables is normal (Table 2).

The results of the Levin test to examine the homogeneity of variance of dependent variables in three groups. In other words, the two experimental and control groups have a significant difference in the variables of object, force, human, and causality, which according to the effect size measuring, 88% of the total variance of the first experimental and control groups is rooted in the effect of the cognitive behavioral therapy. The effect size measuring, 89% of the total variance of the second experimental and control groups are rooted in the effect of the Dialectic behavior therapy. The significant results of MANCOVA

indicated; CBT F score for object (30. 6), force (57.9), human (60.1), and causality (39. 5) with P=0.01. DBT F score for object (32.8), force (59.8), human (59.4), and causality (39.8) with P=0.01. The CBT effect size, for object is 0.73, for force is 0.56, for human is 0.61, and for causality is 0.69. The DBT effect size, for object is 0.75, for force is 0.57, for

human is 0.63, and for causality is 0.68. these effect sizes show the meaningful effects of CBT and DBT on pain metaphorical perception subscales, but it seems that the effect of dialectical behavior therapy was more than cognitive behavioral therapy (object, force, human, and causality) (Table 3).

Table 3) Descriptive Indices of variables in experimental and control groups

Variables	Groups	Mean	SD	Shapiro Wilk	P*	
Object	Pre-test	Experimental 1	26.31	1.15	0.180	0.052
		Experimental 2	26.35	1.12	0.124	0.056
		Control	26.33	1.14	0.136	0.041
	Post-test	Experimental 1	31.33	1.87	0.104	0.050
		Experimental 2	31.35	1.93	0.112	0.048
		Control	26.35	1.11	0.115	0.059
Force	Pre-test	Experimental 1	30.11	1.84	0.125	0.052
		Experimental 2	30.13	1.85	0.128	0.050
		Control	30.12	1.73	0.142	0.047
	Post-test	Experimental 1	35.24	2.09	0.184	0.041
		Experimental 2	35.27	2.12	0.162	0.043
		Control	30.14	1.77	0.166	0.056
Human	Pre-test	Experimental 1	29.17	1.79	0.112	0.038
		Experimental 2	29.19	1.83	0.117	0.043
		Control	29.16	1.07	0.146	0.051
	Post-test	Experimental 1	33.27	2.09	0.129	0.043
		Experimental 2	33.29	2.09	0.119	0.051
		Control	29.16	1.02	0.152	0.065
causality	Pre-test	Experimental 1	28.37	2.69	0.163	0.047
		Experimental 2	28.39	2.23	0.162	0.042
		Control	28.35	2.59	0.173	0.025
	Post-test	Experimental 1	33.27	3.71	0.163	0.041
		Experimental 2	33.29	3.51	0.171	0.043
		Control	28.34	2.84	0.170	0.053

Table 4) Results of Univariate Analysis of Covariance on the Mean of Post-Test Scores of Pain Metaphorical Perception Subscales (object, force, human, and causality)

Variables	SS	SS Error	DF	MS	MS Error	F	P	Effect Value	
Object	CBT	128.36	84.52	2	128.36	4.19	30.6	0.01	0.73
	DBT	131.27	86.25	2	131.27	3.99	32.8	0.01	0.75
Force	CBT	121.14	47.99	2	121.14	2.09	57.9	0.01	0.56
	DBT	124.41	47.97	2	124.41	2.09	59.5	0.01	0.57
Human	CBT	127.47	54.45	2	127.47	2.12	60.1	0.01	0.61
	DBT	128.31	55.21	2	128.31	2.16	59.4	0.01	0.63
Causality	CBT	162.74	64.83	2	162.74	4.12	39.5	0.01	0.69
	DBT	165.41	64.81	2	165.41	4.15	39.8	0.01	0.68

Discussion

The purpose of this study was to compare the effectiveness of cognitive-behavioral therapy and dialectical behavioral therapy on pain metaphorical perception in patients with chronic pain. As results indicated; cognitive-

behavioral therapy and dialectical behavioral therapy increased the pain metaphorical perception (object, force, human, and causality) in patients. These results are consistent with the findings of Lackner, et al. [13], Kutsuzawa, et al. [17], Norman-Nott, et al.

[21], and Barrett, et al.[22]. In these studies, it has been shown that cognitive behavioral therapy and cognitive behavioral therapy are effective on pain. But this study clearly states that these two treatment methods are effective on a cognitive process or in other words an interpretation of pain that is metaphorical.

According to Beck's approach, the goal of cognitive behavioral therapy for chronic pain is to help patients change their thinking about how to manage pain [27]. Because, the meaning of pain management with cognitive-behavioral therapy is not only imaginary pains that occur without any physical cause, but all the kinds of pain that exist in our minds [28]. Cognitive behavioral therapy helps patients understand that pain is a stressor that they can adapt to and cope with, like any other stressor [29]. Therefore, interventions of CBT may include relaxation training, pleasant activity planning, cognitive restructuring, and guided exercises, all within the framework of developing a strong empathic relationship with the therapist. These interventions can reduce pain intensity, improve quality of life, and improve physical and emotional performance [30]. Dialectical behavior therapy is a type of speech therapy. This treatment method is based on cognitive behavioral therapy. This method is especially suitable for people who experience very strong emotions [31]. It empowers the core skills of mindfulness and distress tolerance with techniques such as deep breathing and mindfulness meditation during chronic pain. These exercises encourage one to remain focused and calm during emotional challenges such as pain perception [32]. Although dialectical behavior therapy uses components of cognitive-behavioral therapy, it seems that the reason for its high effect size on the metaphorical perception of pain compared to cognitive behavioral therapy is that it relies heavily on emotions and verbal expression.

This study, like any other study, has limitations. One of the limitations of this category of studies is the non-cooperation of patients during psychological interventions. For this reason, it was not possible to continue and have a follow-up. Most of the patients had

to not attend the sessions for their treatments and the meetings were delayed. Based on this, researchers are suggested to pay attention to these factors in samples that suffer from pain for further studies. It is also suggested to use other interventions to study the metaphor of pain.

Conclusion

The findings of this research emphasized the effectiveness of cognitive-behavioral therapy and dialectical behavior therapy on pain metaphorical perception. As a result, by changing the metaphors of pain in patients, the interpretation of pain can be changed. Cognitive and health therapists can use the data of this study in the treatment of pains that are mostly mental and have psychological roots. Also, this study, as an interdisciplinary study, can help researchers in achieving new studies in this field.

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Authors' Contribution

RR (corresponding author) helped in writing the introduction and discussion as well as statistical analysis. SA helped in the introduction writing & methodology designing, AL helped in methodology designing, and HD contributed to sampling, and data gathering.

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

Ethical principles in writing the article have been observed according to the instructions of the National Ethics Committee and the COPE regulations. All ethical principles were respected. Written consent was obtained from all participants.

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