



# Effectiveness of Pain Metaphor Training on the Mindfulness and Chronic Musculoskeletal Pain

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## ABSTRACT

**Aims:** Conceptual metaphors can change the cognitive capacity in patients. The purpose of this study was to investigate the effectiveness of metaphor protocol training on mindfulness and chronic pain experience in musculoskeletal patients.

**Method and materials:** The method of this study was Quasi-experimental. The statistical population included all musculoskeletal patients in Tehran in 2023. In this study, 40 musculoskeletal patients were selected using the available sampling method. They were randomly assigned to the experimental and control groups (each group 20 patients). The participants completed the Mindfulness Scale, and Chronic Pain Questionnaire in the pre-test and post-test stages. The metaphor training protocol taught to the experimental group in ten sessions. The control group received no intervention. Data was analyzed by SPSS-26 software.

**Findings:** The multivariate analysis of covariance indicated metaphor protocol training increased the mindfulness and decreased the chronic pain experience ( $P < 0.001$ ).

**Conclusion:** Training of metaphorical pain perception protocol can change the mindfulness status and alleviate the chronic pain experience in musculoskeletal patients. Physicians and clinical psychologists can use the results of this study in the treatment of patients with chronic pain.

**Keywords:** Mindfulness, Chronic Pain Experience, Pain Metaphor Protocol, Musculoskeletal Patients

## Introduction

Musculoskeletal pain includes pain in muscles, bones, ligaments, tendons, and nerves. These kinds of pain can happen at any age, but the probability increases with age<sup>[1]</sup>. The most common musculoskeletal pain is neck pain, which most people have experienced<sup>[2]</sup>. Bad sitting or prolonged immobility of the body, type of job and heredity can be the main factors causing or aggravating musculoskeletal pain<sup>[3]</sup>. As well as, mental or psychological and cognitive factors have important role in aggravating musculoskeletal pain<sup>[4]</sup>. Mindfulness means paying attention to the present in a specific, purposeful and non-judgmental way. It means being in the moment with whatever is happening now<sup>[5]</sup>. Accordingly, this process includes creating a special method of paying attention to experiences that is more or less different from the usual method and daily life<sup>[6]</sup>. In this

regard, the individual is asked to suspend the judgments about the experiences<sup>[7]</sup>, and direct conscious repeatedly to the flow of events that are within the awareness<sup>[8]</sup>. A systematic review indicated that chronic pain decreases when mindfulness and quality of life is increased<sup>[9]</sup>. Chronic pain is related to psychological factors as depression, and self-efficacy<sup>[10]</sup>. Chronic pain is pain that lasts more than 3 months or takes an excessive amount of time to heal at the injured organ or part of body<sup>[11]</sup>. As a result, an individual's experience different pain severity based on the intensity of the pain, the damaged tissue, and the duration of pain recovery<sup>[12]</sup>. In addition to psychological dimensions, many cognitive dimensions can make pain become long as chronic pain, and vice versa<sup>[13]</sup>. One of these factors is conceptual metaphors<sup>[14]</sup>. There is evidence that certain diseases such as endometriosis,

complex regional pain syndrome and neuropathic pain have specific pain metaphors that facilitate the diagnosis of these diseases<sup>[15]</sup>.

Conceptual metaphors were introduced by Layoff and Johnson<sup>[16]</sup> in cognitive linguistics. Conceptual metaphors have two semantic domains of source and target<sup>[17]</sup>. The source domain is based on physical characteristics, and target domain can be conceptualized<sup>[18]</sup>. Metaphor therapy is a therapeutic method focused on dialogue, and training which is a dialogue method that tries to improve the cognitive level of patients by maintaining emotional and psychological balance<sup>[19]</sup>. In this therapy, clients and patients express their emotions and experiences metaphorically and relieve their psychological problems. Then, they achieve personal meaning of life<sup>[20]</sup>. It is noteworthy that third wave cognitive therapists, such as mindfulness-based therapies, compassion therapy, and acceptance and commitment-based therapies, use therapeutic metaphors as verbal facilitator tools<sup>[21]</sup>. In these treatments, metaphors cause cognitive involvement with the treatment, and create insightfulness via activating amygdala, hippocampus and fusiform gyrus in the brain<sup>[22]</sup>.

A study indicated that metaphors can increase the sense of mindfulness during therapy by forming new neural circuits<sup>[23]</sup>. In a study, results showed metaphors of mindfulness in pediatric occupational therapy enhanced the consciousness of children during and after the therapy<sup>[24]</sup>. A study showed metaphor Therapy can reduce the psychological symptoms (depression, anxiety, and stress) and pain in patients with non-cardiac chest pain<sup>[25]</sup>. Changes in pain metaphors during metaphor therapy have reduced pains caused by unknown diseases such as burning mouth syndrome<sup>[26]</sup>. A study showed that making metaphorical stories by patients has reduced the pain intensity experiences, and its catastrophizing<sup>[27]</sup>.

The use of metaphor in the treatment process refers to the powerful effect of language, especially metaphors, in the treatment process. As mentioned, metaphors play a major role in third wave psychotherapies, and

it seems; Metaphors increase the effectiveness of these treatments. But metaphor therapy itself as an independent therapeutic method has been neglected in the research literature. Although there has been sparse research on pain, and most researches have equated metaphor with mindfulness. But the present study tries to separate these two concepts. In this study, the researchers are looking for this issue that is the effectiveness of metaphor protocol training on mindfulness and the chronic pain experience in musculoskeletal patients.

### Method and Materials

This study was a Quasi-experimental research with a pre-test, post-test and intervention/control group. The statistical population included all musculoskeletal patients in Tehran in 2023. Hereby, 40 musculoskeletal patients were selected based on Cohen's formula using the available sampling method. They were randomly divided into the experimental, and control groups (each group 20 patients). The including criteria were suffering from musculoskeletal disease for one year, being able to participate in the sessions and the possibility of continuing the sessions. The exclusion criteria were non-cooperation with the group and not participating in more than two sessions. The metaphor training protocol taught to the experimental group in ten sessions. No training was given to the control group. The participants completed the questionnaires of this study in the pre-test and post-test stages. Participants were assured that their information would remain confidential and that they could withdraw from the treatment whenever they could not. Data was analyzed using the multivariate analysis of covariance by SPSS-26 software. The tools that were applied for this study were as follows.

**Mindfulness Scale (MS):** This scale was developed by Brown and Ryan<sup>[28]</sup>, and has 15 items. The questions of the scale measure the construct of mindfulness on a six-point Likert scale (from almost always: 1 to almost never: 6). this scale provides an overall score for mindfulness that ranges from 15 to 90, with a

higher score indicating greater mindfulness. The cut score of this scale is 70. The internal consistency of the scale questions was reported based on Cronbach's alpha coefficient of 0.89. The validity of the scale, considering its negative correlation with tools for measuring depression (-0.84) and anxiety (-0.79) and positive correlation with tools for measuring positive affect (0.92) and self-esteem (0.86), is sufficient to report. In Iran, researchers calculated the psychometric properties of this scale on 300 students. The convergent validity of this questionnaire was obtained with the five-dimensional questionnaire of mindfulness ( $r=0.78$ ), which was very favorable. Cronbach's alpha coefficients for the general scale of Philadelphia mindfulness were 0.92 and the three subscales of awareness, acceptance and recognition of negative emotions were 0.80, 0.86 and 0.87, respectively [29]. In this study, internal reliability was obtained through Cronbach's alpha of 0.82.

**Chronic Pain Questionnaire:** This questionnaire was created by VanKorff, et al. [30]. This questionnaire has 7 questions and its purpose is to measure the amount of pain and its dimensions. This questionnaire has 3 subscales, which are: pain intensity, pain experience, and pain duration. The scoring method is based on a 10-point Likert scale, from not at all to 10 very much. The minimum possible score is 0 and the maximum is 70. A score higher than 35: the amount of experience of chronic pain is high. In a study conducted by Matthie et al. [31] on this scale using 400 patients with pain. The internal reliability of the scale was 0.91 and the validity of all questions was more than 0.75. In this study, internal reliability was obtained through Cronbach's alpha of 0.88.

**The intervention of pain metaphor training:** The pain metaphor training protocol was designed based on cognitive analysis of pain metaphor [14]. Verbal stimuli and metaphorical images were designed for each pain source domain. To determine the content validity of pain metaphorical perception protocol by experts, the method of Waltz and Bassel [32] was used. This protocol was trained to the experimental group (one session per

week, for a total of ten weeks, during three months) for one hour. Its contents are listed in Table 1.

### Findings

In this study, 23 women and 17 men participated. In experimental group, 12 women and 8 men were assigned. In control group, 11 women and 9 men were placed. The average age and standard deviation in the experimental group was  $56.37 \pm 3.42$ ) and in control group was  $57.09 \pm 3.38$ ). All people in both groups were married. One of the assumptions of the analysis of covariance test is to check the homogeneity of variances in the post-test in the study groups. Therefore, Levene's test for the equality of variances was used. Considering the non-significance and confirmation of the null hypothesis in the variables of mindfulness ( $P=0.419$ ,  $F=0.321$ ) and chronic pain experience ( $P=0.341$ ,  $F=0.251$ ), the assumption of the equality variances in the investigated variables are confirmed in the groups. In other words; the equality of variances related to the dependent variables is equal between the two groups. Table 2 shows the means and standard deviation of the mindfulness and chronic pain experience in the study groups. The obtained averages are the result of controlling the pre-test scores in the analysis of covariance test. Table 3 shows the results of covariance analysis of the mean scores of mindfulness and chronic pain experience in the study groups.

In Table 3, the results of covariance analysis show that the mean scores of mindfulness and experience of chronic pain in the experimental group and the control group are statistically significantly different at the level of less than one percent ( $P<0.001$ ). In other words; by referring to table number 2, it can be seen that the averages of the post-test of mindfulness in the experimental group who were trained with the metaphorical pain perception protocol method, have increased compared to the control group who were not trained. It can also be seen in Table 2 that the post-test mean score of chronic pain experience of patients who were who were trained with the metaphorical pain perception protocol

method, have decreased compared to the control group who were not trained. Moreover, the effect size for group membership for mindfulness is equal to ( $\eta^2=0.321$ ) and for chronic pain experience is equal to ( $\eta^2=0.209$ ). Therefore; the

hypothesis of this study that the training of metaphorical pain perception protocol is effective on mindfulness and chronic pain experience in musculoskeletal patients was confirmed.

**Table 1)** Contents of the pain metaphor training protocol (Raiisi, 2021)

Session	Content
1 <sup>st</sup> session	Organizing meetings and justifying patients. Explain the rules and norms of the intervention program. Completing research questionnaires. Explanation about metaphors and their effectiveness.
2 <sup>nd</sup> session	Presenting metaphoric stimuli of pain with object source domain
3 <sup>th</sup> session	Presenting metaphoric stimuli of pain with causation source domain
4 <sup>th</sup> session	Presenting metaphoric stimuli of pain with human source domain
5 <sup>th</sup> session	Presenting metaphoric stimuli of pain with path and direction source domains
6 <sup>th</sup> session	Presenting metaphoric stimuli of pain with place source domain
7 <sup>th</sup> session	Presenting metaphoric stimuli of pain with object and causation source domain
8 <sup>th</sup> session	Presenting metaphoric stimuli of pain with path, direction, and place source domains
9 <sup>th</sup> session	Presenting metaphoric stimuli of pain with human and causation source domains
10 <sup>th</sup> session	Presentation of metaphorical pain stimuli combining six source domains

**Table 2)** Means and standard deviation of mindfulness and chronic pain experience in the groups

Variables	Stages	Groups	Mean	SD
Mindfulness	Pre-test	Experimental	5.5	1.15
		Control	5.8	1.09
	Post-test	Experimental	8.5	2.28
		Control	5.7	1.13
Chronic pain experience	Pre-test	Experimental	7.32	3.72
		Control	7.21	3.62
	Post-test	Experimental	4.91	1.98
		Control	7.19	3.70

**Table 3)** Covariance analysis of the mindfulness and chronic pain experience

Variables	Effect	Df	Mean square	F	P	Eta
Mindfulness	Pre-test	1	21.302	3.021	0.001**	0.121
	Group membership	1	76.23	4.48	0.001**	0.321
Chronic pain experience	Pre-test	1	28.60	5.24	0.001**	0.217
	Group membership	1	98.86	7.31	0.001**	0.209

## Discussion

The purpose of this study was to investigate the effectiveness of metaphor protocol training on mindfulness and chronic pain experience in musculoskeletal patients. The results indicated that metaphor protocol training increased the mindfulness and decreased the chronic pain experience. This result is consistent with previous studies<sup>[23-26]</sup>.

In these research literatures, specific metaphors on changing pain status have been investigated. However, the researchers of this study designed a protocol including verbal and pictorial stimuli. Then, they use various source domains of pain to study their effectiveness on mindfulness and pain experience. As mentioned, every abstract matter has a metaphorical nature, and if it is

not metaphorical, it cannot be understood by the human mind. In the therapy process, metaphors cause new understanding and imagination and empower people to deal with their entities and mental capacities [33]. Excessive use of pain metaphors cannot be a sign of pain intensity, but pain metaphors can cause chronic pain and interfere with daily life [15]. On the other hand, metaphor therapy expresses the perceived experiences of continuous and resistant pain through metaphors. This state produces mindfulness. When we are aware from our mental process without any cognitive limitation, and judgment, the flow of the mind occurs. In this situation the experience of pain is altered due to changing of the mind. Some of musculoskeletal disorders have psychosomatic dimension, and psychotherapies, especially which therapies target cognitive system directly [34]. They can change the psychopathologic factors in the cognition and reshape adjective schemas in the mind. Metaphors are semantic schemas that modify our mental state underlying, and unconsciously.

One of the major limitations of this study is the non-cooperation of patients during training due to pain. As well as, this method of intervention was time-consuming. Because the metaphors had to be taught completely, and because the metaphors were new, we had to repeat the material several times. For future studies, it is suggested that clinical psychology researchers conduct similar studies based on metaphors on psychological and cognitive dimensions

### Conclusion

Training of metaphorical pain protocol is effective on mindfulness and chronic pain experience in musculoskeletal patients. Physicians and clinical psychologists can use the results of this study in the treatment of patients with chronic pain. Metaphor therapy along with cognitive third wave therapies can improve psychological and physical of musculoskeletal patients, and target the cognitive system of patients. Therefore, metaphor therapy can have significant effects both independently and as a complementary

therapy method.

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### Authors' Contribution

F.R: Conceptualization, Methodology, and writing up the manuscript. H.R did data analysis. IS did data gathering and MB did data analysis.

### Conflict of Interest

The authors declare no conflict of interest.

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