



## Research Paper: Effectiveness of Mindfulness-Based Cognitive Therapy on Hope and Pain Beliefs of Patients With Chronic Low Back Pain



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**Citation:** Abdolghaderi M, Kafi SM, Saberi A, Ariaporan S. Effectiveness of Mindfulness-Based Cognitive Therapy on Hope and Pain Beliefs of Patients With Chronic Low Back Pain. *Caspian J Neurol Sci.* 2018; 4(1):18-23. <https://doi.org/10.29252/NIRP.CJNS.4.12.18>

**Running Title:** Mindfulness-Based Cognitive Therapy in Chronic Low Back Pain

**doi:** <https://doi.org/10.29252/NIRP.CJNS.4.12.18>

### Bullet Points:

- MBCT increases the hope but not pain beliefs in chronic low back pain patients.
- MBCT may be developed for decreasing the low back pain.

### Article History:

Received: 15 Oct 2017

Accepted: 11 Dec 2017

Available Online: 01 Jan 2018

### ABSTRACT

**Background:** Patients with Low Back Pain (LBP) suffer from physical and psychological disability. Mindfulness-Based Cognitive Therapy (MBCT) may be an effective treatment option for patients with chronic LBP, but its efficacy on hope and pain belief is uncertain.

**Objectives:** To determine whether MBCT could increase hope and be effective in pain beliefs in patients with LBP.

**Materials & Methods:** In this quasi-experimental study, 30 patients with chronic LBP were selected by convenient sampling method from Neurology and Neurosurgery Clinics affiliated to Guilan University of Medical Sciences, Gilan Province, Iran. Subjects were divided into experimental (MBCT) and control groups (n=15 each) by random sampling method. The experimental group as an intervention received 90-minute weekly MBCT sessions for eight weeks. Adult dispositional hope scale (Snyder hope scale) and pain beliefs and perceptions inventory were administered to both groups as pretest-posttest. The data were analyzed using multivariate analysis of covariance using SPSS 20.

**Results:** Mean age of the patients was 38.41 years. All of the subject were women with high school education. MBCT significantly increased the hope of patients with chronic LBP (P<0.001), however, it was ineffective in pain beliefs.

**Conclusion:** The results of this study demonstrates that MBCT can be an effective treatment for increasing the hope of patients with chronic LBP. MBCT may be developed for alleviating LBP.

**Keywords:** Mindfulness, Low back pain, Hope, Pain

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## Introduction

**C**hronic pain is defined as any pain lasting longer than 3 or 6 months [1] (depending on the type of pain), which can result in significant medical, social, and economic consequences; relationship issues; low productivity; and more substantial health care costs. Researchers and therapists have long been studying the development of chronic pain, and modelled the chronic pain through what is called the biopsychosocial model of pain. The biopsychosocial model explains how biology and genetic (bio), psychological functioning (psycho) and social environment (social) can contribute in pain perception and its management [2]. The famous gate control theory of pain proposes that the brain plays a dynamic and active role in pain perception as opposed to being a passive recipient of pain signals [3]. Hope refers to a positive expectancy of goal attainment [4]. Hope has been formerly a construct more of interest to philosophy and religion than in psychology. Recent research has demonstrated that hope is closely related to optimism feelings of control and motivation toward achieving one's goals. Snyder and colleagues have introduced a new cognitive-motivational model called hope theory [5-7].

Hope theory can be divided into four categories: 1. Goals which are valuable and uncertain are the anchors of hope theory as they provide direction and a target for hopeful thinking; 2. Pathway thoughts refers to the routes we take to achieve our desired goals and the individual's perceived ability to produce these routes; 3. Agency thoughts refers to motivation we have to undertake the routes towards our goals; and 4. Barriers block the attainment of our goals, and in the event of a barrier we can either give up, or we can use our pathway thoughts to create new routes.

Specific pain beliefs have been identified that contribute to poor compliance, motivation, and misunderstanding about pain. These include catastrophic, limited perception of control over the pain experience and emotional distress. Based on study reports, negative pain beliefs have a detrimental impact on patients' overall health, self-efficacy, and function [8].

Chronic Low Back Pain (LBP) is a source of physical disability and diminished psychological functions [3, 9]. It can affect people of all ages from children to elderly and is a common reason for medical consultations. The lifetime prevalence of LBP ranges from 6% to 70% in industrialized countries [10]. Several studies have been

performed in Iran to evaluate the prevalence of LBP [11-13]. The results showed that about 50% of Iranian population suffer from LBP. Despite numerous treatments for LBP, there is still a need for treatments with proven effectiveness, low risk, and widespread availability.

Various studies have demonstrated that mindfulness can alleviate chronic pain [14-17]. Based on ancient eastern meditation practices, mindfulness is characterized by paying attention to the present moment with openness, curiosity, and acceptance. Jon Kabat-Zinn began teaching mindfulness course at the University of Massachusetts Medical School in the late 1970s, which was later adapted for clinical settings [18]. Over the past 35 years, mindfulness-based interventions have provided a wealth of evidence over its use fullness in psychological stress, general well-being, and disorders ranging from anxiety and depression to substance use disorders [19, 20]. Mindfulness is becoming increasingly popular in Iran and is using by Iranian researchers for the treatment of psychiatric disorders [21] and physical problems such as LBP [3, 22]. The purpose and the question of this study were to examine the effectiveness of mindfulness on hope and pain beliefs of patients with chronic LBP.

## Materials and Methods

This research was a quasi-experimental study with pre-test and post-test and a control group. The participants included 30 patients with LBP aged between 30 to 50 years (mean age=38.41 y) who were selected through convenient sampling method from Neurology and Neurosurgery Clinica affiliated to Guilan University of Medical Sciences. Patients with LBP who were diagnosed by a neurologist were placed randomly in two groups of experiment and control (n=15 each). Both group were matched on severity and duration of pain by the diagnosis of a neurologist. Inclusion criteria were having chronic LBP which lasted longer than six months. Patients who abused substance or had mental disorders were excluded from the study. MBCT programme was administered by an experienced psychologist for the experimental group (for each patient individually) one session per week for eight weeks. Each session lasted for 90 minutes. In the first session, the patients received relevant information about the fundamentals of mindfulness, its description and mindful living techniques. The contents of subsequent sessions are body scan, awareness of breath, sitting meditation, acceptance of thoughts and emotions and awareness of pleasant and unpleasant events (Table 1) [23]. Kabat-zinn [19, 20] introduced the protocol of MBCT that used in this study. The intervention was carried out for each person individually.

**Table 1.** Protocol of “mindfulness-based cognitive therapy” designed by Kabat-zinn

Section 1	Pretest, general information about mindfulness and mindful living techniques
Section 2	Introduction to type of breathing, awareness of breathing, breath meditation
Section 3	What is body scan? Techniques of awareness of bodily sensation
Section 4	Setting meditation
Section 5	Mindfulness from eating and other daily activities
Section 6	Mindfulness from thoughts and emotions
Section 7	Awareness of pleasant and unpleasant
Section 8	Summary and conclusion, post-test


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The instruments of this study were Adult Dispositional Hope Scale (Snyder hope scale), pain beliefs, and perceptions Inventory. Snyder hope scale is a 12-item measure of a respondents level of hope. In particular, the scale is divided into two subscales that comprise Snyders cognitive model of hope: 1. Agency (i.e., goal-directed energy); and 2. Pathways (i.e., planning to accomplish goals). Each item is rated using a 8-point Likert-type scale ranging from definitely false to definitely true [4-6]. The Cronbach  $\alpha$  and test-retest reliability were determined as 0.86 and 0.81, respectively in Kermani study [24, 25].

Pain beliefs and perceptions inventory has 16 items that was constructed by Williams and Thorn [26, 27]. The inventory assesses three dimensions of pain beliefs; 1. Self-blame; 2. Perception of pain as mysterious; and 3. Beliefs about the duration of pain. Test-retest reliability of this inventory was reported as 0.80 [26] and the Cronbach  $\alpha$  value of subscales of this test was reported from 0.70 to 0.77 [25]. The multivariate analysis of covariance was used for analysis of data in SPSS (version 20).

## Results

In this study, all of the subject were women with high school education and mean age of 38.41 years. Table 2 displays means and standard deviations of hope and pain beliefs scores in two groups at pre-test and post-test.

Before performing the MANCOVA, the BOX test was carried out to assess the homogeneity of the variance-covariance matrices and the results demonstrated homogeneous matrices ( $f_{Box}=0.434$ ;  $P<0.856$ ). The equality of error variances was also assessed using the Levene's test for pain beliefs ( $f=0.597$ ;  $P<0.58$ ), and Hope ( $f=0.282$ ;  $P<0.756$ ). Also, the homogeneity of regression slope was performed by contraction of pretest of pain beliefs and group ( $f=0.640$ ;  $P<0.538$ ) pretest of hope and group ( $f=1.083$ ;  $P<0.379$ ). The p value demonstrated the homogeneity of regression slope. The relationship between pretest and post-test of pain beliefs ( $r=0.518$ ;  $P<0.003$ ) and between pretest and post-test of hope ( $r=0.486$ ;  $P<0.006$ ) were lower than 0.80.

**Table 2.** Means and standard deviations of hope and pain beliefs scores study group at pretest and post-test

Variable	Group	Mean (SD)		Normality Tests	
		Pre-test	Post-test	Shapiro-Wilk	P
Pain beliefs	MBCT	4.50(1.45)	4.47(0.700)	0.959	0.256
	Control	4.16(1.08)	4.98(0.219)		
Hope	MBCT	26.50(3.47)	30.0(1.76)	0.957	0.253
	Control	25.50(3.31)	23.5(2.48)		


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**Table 3.** Multivariate analysis of covariance for hope and pain beliefs and hope dimensions in study groups

Dependent Variables	Sum of Square	Mean of Square	F	P
Pain beliefs	0.233	0.233	0.005	>0.025
Hope	150.833	150.833	17.630	<0.025
Hope (agency)	36.300	36.300	8.894	<0.025
Hope (pathways)	44.133	44.133	13.359	<0.025



Table 3 shows the results of MANCOVA for hope and pain beliefs and also hope dimensions in two study groups. Based on the Bonferroni alpha-correction of 0.05 divided by the number of the dependent variables, the level of statistical significance for each variable was calculated as less than 0.025. Because the levels of statistical significance for hope, agency, and pathways were less than this value, MBCT significantly increased hope ( $P<0.025$ ) and its dimensions (agency and pathway) ( $P<0.025$ ) but has no effect on pain beliefs.

## Discussion

This study demonstrated the effectiveness of MBCT on the hope of patients with chronic LBP. Acceptance-based interventions such as mindfulness have beneficial effects on the physical and mental health of patients with chronic pain [3, 9, 15-17, 19, 22, 28, 29]. During body scan practice, subjects learn to see what their real body condition truly is, without trying to change the reality. Accepting their chronic illness helps them see the other possible abilities in their social and emotional roles. Through direct experience in body scan, patients realize the interconnection between mind and body which increases patient's self-control over his or her life. Mindful living techniques help experience of the subtle positive emotions, like peace and joy, self-esteem, and confidence [18, 30]. As a result, with mindfulness techniques, people learn how to manage their health and begin to engage in their duties mindfully.

Hope is defined as the perceived capability to derive pathways to desired goals and motivate oneself via agency thinking to use these pathways [4]. Higher hope is always related to better outcomes in physical and mental health. High hope individuals do not react to barriers in the same way as low hope individuals. Instead they view obstacles as challenges to overcome and use their thoughts to plan an alternative route to their goals [5, 6]. The result of this study about the effectiveness of mind-

fulness on hope is consistent with the previous studies in this field [7, 31-33].

The present study demonstrated that MBCT could not be useful in pain beliefs, which is not consistent with the previous studies [26, 27, 33, 34]. A possible explanation is that the pain beliefs and perceptions inventory only assesses one aspect of pain namely cognitive or psychological aspect. According to the biopsychosocial model, physiological and social factors also play an essential role in pain which was not assessed by the inventory.

One limitation of this study was low sample size and using convenient sampling method which may restrict the generalization of the results. Use of unprescribed drugs in our patients can decrease their pain, which we did not have control over that. Also, we could not follow up the results.

## Conclusion

MBCT is a useful intervention for increasing hope in patients with chronic LBP but is not effective in pain beliefs. MBCT may be developed for alleviating LBP.

## Acknowledgments

We thank our patients for their kindly collaboration. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Conflict of Interest

The authors declared no conflicts of interest.

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