

The effectiveness of Mindfulness-Based Cognitive Therapy on the illness perception and Psychological Symptoms in patients with Rheumatoid Arthritis

Zahra Dalili, Mohammad Hossein Bayazi*

Department of Psychology, Torbat-e-Jam Branch, Islamic Azad University, Torbat-e-Jam, Iran



ARTICLE INFO

Keywords:

Mindfulness-based cognitive therapy (MBCT)
The illness perception (IP)
Psychological symptoms (PS)
Rheumatoid arthritis (RA)

ABSTRACT

This study was conducted to evaluate the Effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) on the Illness Perception (IP) and Psychological Symptoms (PS) for Patients in primary care with an active symptom of Rheumatoid Arthritis (RA). The present design is a clinical trial that uses the pre-test and post-test design with a control group. MBCT as an evidence-based psychotherapeutic intervention and Mindfulness-Based Intervention (MBI), is an 8-week course developed for patients with relapsing depression that integrates mindfulness meditation practices and cognitive therapy. This semi-experimental study was conducted using a pretest-posttest and control group. Diagnostic criteria for the diagnosis of patients with RA were all patients with RA who visited the clinic of Jam Rheumatology Centers and met other inclusion criteria in Mashhad in the spring of 2018. Therefore, 28 patients were randomly selected from the diagnostic group. They were randomly assigned to an experimental group and a control group (14 individuals in each group) and then were post-tested after two months. The data were collected using the revised Illness Perception Questionnaire (IPQ-R) and Depression Anxiety Stress Scales (DASS-21 scores) which were completed by the participants. The data were analyzed using repeated measures MANOVA. The results showed that there was a significant difference between the mean scores of pre-test (before MBI) and post-test (after MBI) in the experimental group compared to the control group, and MBCT had a significant effect on the perception of the disease and the psychological syndrome in the experimental group compared to the control group. Therefore, it can be concluded that MBCT is effective on IP and psychological syndrome and can be used as an MBI method to reduce the illness perceptions in people with RA. The future researches with longer pursuing period's efficacy continuation are suggested.

1. Introduction

The disease, like health, is the result of a complex interaction of biological, psychological and social variables. From this perspective, diversity in the effects of the disease is due to psychological states, biological, cultural and social changes that shape the patient's perception of the disease and his/her response to it [1]. Chronic pain (CP) impose people a condition called chronic pain syndrome (CPS). CPS has both physical and mental root. That's when people have some social and psychological outcomes like depression and anxiety [2–5] which interfere with their daily lives. One of the most common forms of CP in which patients suffers an ongoing degenerative illnesses is RA. The RA is a chronic multi-systemic illness that approximately two-thirds of patients gradually began to develop with fatigue, anorexia, general weakness, and muscular musculoskeletal symptoms on both sides of the

body (as symmetry) that remained stable for weeks or months. In a meta-analysis of the 1980–2000 research on the treatment of depression in patients with lumbago, it has been shown that a combination of medical and psychological treatments has a better effect on the treatment of these patients than each one treatment alone. Because CP interferes with the treatment and the process of depression; it prevents depression from being improved. Combined treatment leads to more control over pain and more effective treatment [6,7]. CP is usually associated with depression, a poor social environment, and an unsanitary environment of the family, and can be effective in physical therapy. Therefore, emotional and psychological treatment can be the main prerequisites for physical therapy of CPs. According to the World Health Organization report, over 75% of patients with depression complain of pain-related symptoms such as neck and back pain and also people with RA [8]. The researches in this case has shown that patients

* Corresponding author.

E-mail address: bayazi123@yahoo.com (M.H. Bayazi).

<https://doi.org/10.1016/j.ctcp.2018.11.012>

Received 21 October 2018; Received in revised form 12 November 2018; Accepted 21 November 2018

1744-3881/ © 2018 Elsevier Ltd. All rights reserved.

Subjects with major depression were four times more likely to report CP [9].

Recently, the role of IP on health-related quality of life (HRQOL) of patients with chronic diseases has been considered. The concept of perceived disease is a representation of the patient's organized knowledge of his/her illness. According to Leventhal, Meyer, and Nerenz [10]; patients determine their behavioral and emotional response to the disease based on their perceptions about the nature, causes, outcomes, control, and curative and duration of the disease. The IP consists of information in five dimensions: the label and symptoms associated with the disease (such as the identity or belief about the causes of the onset of fatigue and weakness), the cause or perception of the person about the timeline of the illness. The relationship between the IP and the outcomes of various diseases has been studied. The findings indicate a significant role of the IP in determining the outcomes and adaptation to disease.

Mindfulness is defined as a stimulated attention state and awareness of whatever happens at the moment [11,12]. Mindfulness-Based Cognitive Therapy (MBCT), as a group-based program, derived from Mindfulness-based interventions (MBIs), and was designed for people with a history of recurrent depression to help prevent future recurrences [13,14]. According to this model, patients who experienced several periods of depression, have a severe reaction and vulnerability to the relapse and depression [15]. MBCT was developed to avoid the configuration of a depressive episode. This was done by proposing a systematic training in mindfulness meditation to participants. MBCT exercises contain prolonged periods of sitting meditation, simple yoga exercises, and the body scan and also some elements of cognitive behavioral therapy (CBT). Many studies have shown that MBCT is effective in the treatment of depressive disorders and leads to therapeutic change such as reducing psychological distress and improving HRQOL and well-being [2,12,16–18]. Hofmann, Sawyer, Witt, and Oh [19]; investigated the effect of MBSR and MBCT on symptoms of anxiety and depression and concluded that MBCT has been effective in the reduction of depressive symptoms. They also found the MBCT as a promising intervention for treating anxiety. Piet and Hougaard [20] performed a meta-analysis to evaluate the effect of MBCT for prevention of depressive disorder and found that MBCT reduced the risk of recurrence of depressive disorder by 34–43%. Spijkerman, Pots and Bohlmeijer [21]; investigated the effectiveness of online MBI in improving mental health. The results showed that the more the intervention sessions were, the greater their effect on improving mental health, especially stress [22]. In a MBCT approach, pain is accepted as an inevitable part of life. The purpose of these approaches is to create psychological flexibility when presenting the thoughts, feelings, and behaviors associated with pain in the patient [23]. Mental exercises can change the attitude to pain (Germer et al., 2005), and provide opportunities to avoid pain [24]. Several studies have shown the effectiveness of these MBIs in increasing the acceptability and reduction of severity of pain and physical complaints in different groups of patients with CP [25,26]. Illness perceptions is the attitudes, beliefs, and expectations of patients about illnesses such as pain. Illness perceptions is related to health information behavior practices and coping strategies [27,28]. Roberts and Danoff-Burg [29]; investigated the relationship between MBCT and health behaviors and found that MBCT is related to decreased stress and to increased positive health perceptions and health behaviors. Davis, Zautra and Wolf [30]; utilized the MBCT and CBT for CP and found that for adults with RA, the MBCT produces the more improvements in daily pain and stress reactivity relative to CBT and is cost effective and effective as well CBT. Panahi and Faramarzi, [31]; investigated the effects of MBCT on depression disorders (depression and Anxiety) in patients with premenstrual syndrome and concluded that MBCT improved depression symptoms. Sado, Park, Ninomiya, Sato, Fujisawa, Shirahase et al. [32]; assessed the effectiveness of MBCT and found a significant improvement in anxiety disorders of participants. Shulman, Dueck, Ryan, Breau, Sadowski et al. [33]; implemented a MBCT intervention as

a treatment for postpartum depression and anxiety and found a clinically significant effect on participants. It seems that MBCT has a high ability and potential in implementing of experiential avoidance strategies, which are endeavors to diminish the intensity or frequency of CP and also other unwanted outcomes and depressive disorders such as depression and anxiety [34]. Despite a growing trend in the use of MBCT due to an empirically founded theoretical rationale for it, there is still a little information about how and why it (MBCT) works. Therefore, in order to optimize treatment outcomes, it is essential to understand its preventive and avoidance mechanism against the IP and PS. So, according to the above, the main goal of this study was to evaluate the Effectiveness of MBCT on the IP and PS for patients in primary care with an active symptom of RA. Therefore, the basic question of this research is given that depression, anxiety and stress experienced in RA patients are the result of their pain and illness and can affect their perception of their disease, and vice versa. So, can MBCT be effective on the perception of the disease, especially pain experience and reduction of psychological problems in these patients? And generally, reduce pain?

2. Method

2.1. Research design

The present design is a clinical trial. This applied objectives and semi-experimental method were conducted using a pretest-posttest and control group. The independent variable was group membership (MBCT and control), and dependent variables, was the scores of the subjects in the scale of the IP and PS for Patients in post-test. Subjects' scores were considered as a control variable in the pre-test of these instruments.

2.2. Ethical issues

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Participants were informed that their participation in the study was voluntary and was not connected to their place of employment. Participants had the right to withdraw from the study without any negative consequences. Participants were also advised that there were no known risks involved in completing the survey [35].

2.3. Participants: population and sample

Diagnostic criteria for the diagnosis of patients with RA were all patients with RA who visited the clinic of Jam rheumatology centers and met other inclusion criteria in Mashhad in the spring of 2018. The sampling of the present study was a target-oriented sampling, of which 28 individuals were selected and randomly assigned to control and experimental groups. Due to the absence of one participant in the experimental group, the number of recruited participants decreased to 14, so, due to the alignment of the control group, one person was randomly excluded from the control group (14 individuals in each group) and followed up for two months (Fig. 1). The input criteria of the research include: having the consent to participate in the research, having at least a diploma education, having an interest and motivation to participate in the research. The exit criteria (withdraw) of the research include the absence of more than 2 sessions, non-attendance, counseling and psychotherapy sessions, psychotic disorders, and addiction.

2.4. Instrumentation

2.4.1. The revised IP questionnaire (IPQ-R)

This self-completed instrument was built in the Diefenbach and Leventhal's Common-Sense Model (CSM) to provide a quantitative

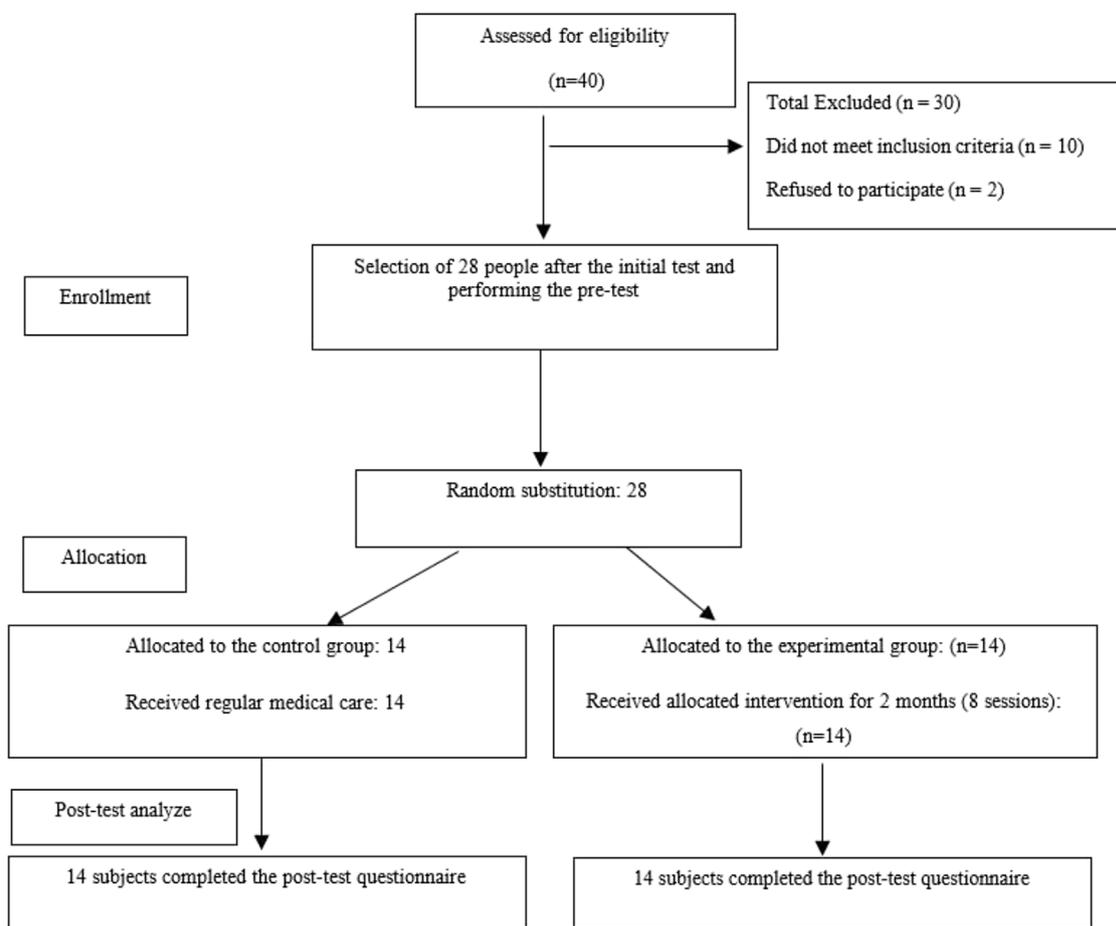


Fig. 1. Participant flow throughout the study.

measurement of the 5 components of illness representations. It is divided into three sections: identity subscale (14 symptoms), causal subscale (18 causes), and a third section which contains 7 subscales, including consequences, timeline acute/chronic and cyclical, personal and treatment control/cure, illness coherence, and emotional representations [36]. So far, it has been adapted to a wide range of diseases, such as heart disease, RA, cancer, etc. In the present study, a short form of the perception questionnaire (Illness Perception Questionnaire (IPQ) was used to ease the work and to observe the clients' attitude. This 9-item questionnaire designed to evaluate the emotional and cognitive impairment of the disease [37]. IPQ-R is a 5-point Likert style scale, ranging from strongly disagree to strongly agree [36,38,39]. The internal consistency of the subscales showed that the internal consistency of the subscales varies from 0.23 (chance and accident attributes) to 0.89 (illness, acute/chronic). The retest reliability of the sub-scales after three weeks was between 0.46 (personal control) and 0.88 (risk factors) and after six months was between 0.35 (consequences) to 0.81 (emotional representations). The reliability coefficient of this questionnaire was tested from 0.48 to 0.70 for each subscale [38]. In this research, Cronbach's alpha was 0.88 (demonstrating reliability in general) and its correlation coefficient with Persian version was 0.71. In general, the results of the evaluation of the Persian version of this scale have been good and satisfactory [37].

2.4.2. Depression Anxiety Stress Scales (DASS)

The DASS has 42 items. The DASS-21 has 21 items if you are under time pressure. The psychological syndrome is measured in the form of the 21-item questionnaire of depression, anxiety, stress (DASS-21). DASS-21 is a clinical assessment that measures mental health, focusing on the three traits of depression, anxiety, and stress (an interactive

version of DSS) and provided for educational use only [40,41]. This questionnaire technically is a simple scale 21 questions and each of the constructs of depression, anxiety and stress are evaluated based on 7 questions. DASS-21 (short form questions) is graded according to a four-point Likert scale, with anchors that range from 0 (at all) to 3 (very much, or most of the time). The DASS-21 scores are multiplied by two so that one can compare the DASS-21 score with the normal DASS. Table 1 presents the interpretation of DASS scores. In numerous foreign and domestic researches, validity and reliability of the short form of the DASS-21 scale have been reported as desirable. In the present study, the reliability of the DASS-21 scale based on the Cronbach's alpha coefficient for depression, anxiety, stress, and the total scale was 0.9, 0.81, 0.89, and 0.92 respectively.

2.5. MBCT intervention plan

The MBCT intervention (MBI) program as a cost-effective intervention, consists of eight weekly 2-h sessions that can be run weekly

Table 1 Interpretation of DASS scores [41].

Meaning	Components		
	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	28+	20+	34+

Table 2
The subject and the content of the meetings.

Session	Content
1	Pre-test, Patient Evaluation, Awareness with Mindfulness and Expression of Logic, and Homework Presentation to Strengthen Content.
2	Teaching and practicing mindfulness techniques with breathing awareness to increase attention and concentration capacity, including 45-min body checks, 10 min of breathing, along with mindfulness and logic of each of these techniques, thinking about exercises
3	Performing a technique of slowly muscular tone, exercising vigilance, widespread keeping mind and mind through the pursuit of meditative exercises and focusing on conscious breathing (the concept of automatic guidance and states of mind) familiarity with the logic and purposes of this therapy (relationship with the world in a kind Oh, different) and practice mind-boggling technique, 3-min breathing
4	Creating acceptance and mindfulness by abandoning the attempts to control and cognitive failure and reviewing past sessions and assignments
5	A 45-min session of meditating technique, expressing logic, a 3-min breathtaking exercise, and providing simulated exercises for use in times of emotion. Understanding Beck's Model of anxiety and depression based on the ABC model and understanding your negative being of the disease
6	45 min of sitting session meditation, reviewing patients' problems during home exercise, emotions and excitement during exercise, teaching techniques to respond to their negative thoughts, 3-min workout, and conscious breathing.
7	Performing meditation exercises, listing pleasurable and skillful signs and exercises for the body
8	Summarizing and reviewing the program, receiving feedback from group members, applying lessons for dealing with future creation, closing ceremonies and post-examinations

and for 3 months [42]. The sessions are based on the treatment methods of Segal et al. [14] and based on the conditions of the present research, minor changes have been made. The structure of each session includes: reviewing homework assignments, reviewing the previous session, presenting the first subject and practicing, resting and welcoming, presenting the second topic and exercising, summarizing and presenting the homework assignments of the next meeting. The subject and the content of the meetings are described in Table 2.

2.6. Data collection procedures

In this research, it was used for a field method to collect the required information and complete the standard quality questionnaires. At first, coordination was done by orthopedic specialists, and then a call was announced to participate in the research. In the next step, sampling and assignment of the subjects was done in the experimental and control groups. Before the start of the treatment, two questionnaires of IPQ-R and DASS were carried out in order to conduct a pretest, and the data were recorded. Then a contract of medical treatment was concluded with the participants. The MBI was performed in the group session for 8 sessions. After the end of the treatment process, two questionnaires of IPQ-R and DASS were performed for both groups (testing, control) and the data were recorded. Then, the results were evaluated in the experimental group before and after (pre-test and post-test), and the results were compared with the control group.

2.7. Analytic approach

In the descriptive statistics section, the mean, standard deviation, and distribution tables were used (Table 3) and in the inferential statistics section, the covariance analysis test (MANCOVA) was used to test the research hypotheses and data analysis. All tests were performed at a significant level ($P \geq 0.05$) using SPSS software. Table 4 shows the

Table 3
Descriptive indicators of the IP in two experimental and control groups.

Variables	Evaluation stage	Group	Average	SD
Depression	Pretest	Experimental	15.71	2.52
		Control	14.78	1.88
	Posttest	Experimental	12.64	2.20
		Control	15.35	2.87
Stress	Pretest	Experimental	14.28	1.26
		Control	16.35	1.27
	Posttest	Experimental	12.21	1.42
		Control	16.85	1.35
Anxiety	Pretest	Experimental	12.78	2.91
		Control	13.64	2.87
	Posttest	Experimental	10.42	2.37
		Control	13.85	2.87

Table 4
Evaluation of normal distribution of the IP scores in pre-test and post-test stages.

Variables		Depression	Stress	Anxiety
Pretest	The statistics of K-S	0.80	0.79	0.75
	Sig.	0.54	0.56	0.61
Posttest	The statistics of K-S	0.76	0.89	1.15
	Sig.	0.62	0.40	0.14

values of the Kolmogorov–Smirnov test in the variable of IP in the pre-test and post-test stages, which was 0.77 and 0.92, respectively, which was not significant in comparison with critical levels, and indicates the normal distribution of the IP.

3. Results

3.1. Intervention effects on IP and PS in patients with RA

Evaluation of intervention effects began with the examination of changes in IP and PS within each group separately. Table 5 displays the results of the MANCOVA analysis. This analysis showed a significant difference between the mean post-test of the experimental and control groups in the psychological syndrome scales. In other words, the difference between the scores of the two groups indicates that in general, MBCT has a significant effect on improving on IP and PS in patients with RA.

According to Table 6, mental health MBI has a significant effect on the improvement of the psychological syndrome ($P < 0.0001$).

4. Discussion and conclusion

This study was conducted to evaluate the effectiveness of MBCT on the IP and PS for patients in primary care with an active symptom of RA. This semi-experimental study was conducted using a pretest-posttest and control group, with follow-up of the patients. Diagnostic criteria for the diagnosis of patients with RA were all patients with RA who visited the clinic of Jam Rheumatology Centers and met other inclusion criteria in Mashhad in the spring of 2018.

The first finding of the study indicated a significant effect of MBCT

Table 5
Multivariate covariance analysis (MANCOVA); Difference between test and control groups.

Source	Lambda Wilks	F	Eta Coefficient
Group	0.11	54.28**	0.88

**P < 0.0001.

Table 6
MANCOVA analysis for comparing the experimental and control groups in post-test.

Source	Subscale	Type III Sum of Squares	df	Mean Square	F	Significance
Group	Depression	44.82	1	44.82	60.56**	0.0001
	Stress	45.02	1	45.02	54.83**	0.0001
	Anxiety	33.44	1	33.44	48.85**	0.0001
Error	Depression	17.02	20	0.74	–	–
	Stress	18.88	20	0.82	–	–
	Anxiety	15.74	20	0.68	–	–
Total	Depression	56.48	28	–	–	–
	Stress	43.92	28	–	–	–
	Anxiety	61.17	28	–	–	–

**P < 0.001.

on the IP and PS for patients in primary care with an active symptom of RA. So far, many studies have shown the effectiveness of MBCT in the treatment of chronic diseases, but there is no research about the effect of MBCT on the IP and PS for patients in primary care with an active symptom of RA. In fact, this is the first research to examine the effectiveness of MBCT on the IP and PS for patients in primary care with an active symptom of RA. Therefore, given the lack of research findings on the subject, it can be argued that the findings of this study are in line with studies that outline the benefits of educating mindfulness as one of the third-wave cognitive-behavioral therapies in the treatment of chronic diseases [43]. The findings of the present study are consistent with the results of Keng et al. [17]; Abbott et al. [2]; Strauss et al. [18]; Velden et al. [12]; Gu, Strauss, Bond and Cavanagh [16]; and Anderson [44]. In their research, the researchers concluded that mindfulness plays an important role as a mediating factor in improvement of the depression and anxiety disorders of participants. Also, many of studies have shown that the MBCT has been effective in improving the IP and PS of participants (Roberts and Danoff-Burg [29]; Davis et al. [30]; Panahi and Faramarzi, [31]; Sado et al. [32]; Shulman et al. [33]).

One of the important aspects of MBCT is that people learn to deal with emotions and negative thoughts and experience positive mental events. Another important point is that mindfulness therapy represents the subjective representation of objects in life that is beyond the immediate control of man and is taught through deep breathing and thinking [25]. Considering that the training of MBCT reduces feelings without judgment (nonjudgmental awareness) and increase awareness of psychological and physical emotions and clearly perceives and accepts emotions and physical phenomena as they happen [45], so it can play an important role in modifying the scores of well-being. Research has shown that mindfulness helps people adjust negative behaviors and thoughts and lead to the regulation of positive health behaviors [46,47]. In other words, it can be said that educating mindfulness from the point of view that increases attention and awareness of physical and psychological feelings, and the feeling of trust in life, deep sympathy, a deep sense of love for others, and the true acceptance of life events, can cause an individual to recognize his/her abilities, to cope with life stress, to be a productive and productive career, and to collaborate and participate as a member of the community.

One of the mental skills that can be helpful is acceptance (Acceptance and Commitment Therapy). The relationship between acceptance and change is a central concept in the common psychiatric debates [48]. Therefore, the MBCT makes people accept that severe pain may occasionally occur, transient and not dangerous, and although unpleasant, they should be tolerated and should not be avoided or considered dangerous. The MBCT training, through raising awareness of the present, influences cognitive systems and information processing through techniques such as attention to breathing and body, and focusing on consciousness here and now, and decreases the intellectual rumors and inefficient attitudes in people.

The MBCT also as a nonevaluative present-moment awareness [49]

focuses on patients with a history of depression, who develop their own thoughts and redirect their thoughts to other aspects of the present, such as breathing, walking along with the presence of the mind or the sounds of the environment, and reduces the amount of ruminant thought. Thus, the MBCT can be very helpful in improving the cognitive symptoms of depression. This finding also coincides with the findings of Ryan and Deci [50] and Davis et al. [30]; who believe that the presence of the mind can help rid humans of automated thoughts, habits and unhealthy behavioral patterns and thus play an important role in behavioral regulation. In general, it can be said that the MBCT approach, is in line with the integrity of elements such as the dialectic philosophy of mind, awareness, acceptance, communication, etc., as well as the utilization of all types of mediations as the domains in this approach, as well as more attention on attention control in treatment disturbances such as anxiety, depression, and pain, and therefore confirm the eastern perspective on the interaction of the mind and body with their efficacy in the area of mental health and well-being. Also, Hofmann et al. [19]; found the MBCT as a promising intervention for treating anxiety and mood problems.

The MBCT approach helps people know how to function. Rhymes in this approach are an attempt to resolve bitter excitements through the process of analysis and problem-solving. In fact, through the process of treatment with MBCT, the authors find that problematic thoughts and excitements are transient events that are not necessarily reflective of reality and are not considered as core components. Reaching this decentralized relationship and developing such a different perspective than thoughts and emotions is important. This is what empowers a person to get rid of being trapped in ruminative thinking and its cyclical consequences.

It seems that MBCT has a high ability and potential in implementing of experiential avoidance strategies, which are endeavors to diminish the intensity or frequency of CP and also other unwanted outcomes and depressive disorders such as depression and anxiety [34]. The advantage of this intervention is that it has been written as simple as possible and designed in such a way that is understandable to patients with active symptom of RA. Its implementation does not require specialized expertise and clinical experience in the field of CBT, and therefore it is possible to implement it by relatively trained specialists. Considering the effectiveness of the MBCT approach on perceived illness and PS, it is desirable to consider the MBCT approach in specialized clinical clinics of chronic organ disorders.

Conflicts of interest

The author declares that he has no competing interests.

Compliance with ethical standards

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Acknowledgment

I sincerely appreciate the clinic of Jam Rheumatology Centers in Mashhad for allowing me to carry out this research; I am also thankful to all patients with RA for making the data available for this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2018.11.012>.

References

- [1] R.J. Gatchel, Y.B. Peng, M.L. Peters, P.N. Fuchs, D.C. Turk, The biopsychosocial approach to chronic pain: scientific advances and future directions, *Psychol. Bull.* 133 (4) (2007) 581–624 <https://doi.org/10.1037/0033-2909.133.4.581>.
- [2] R.A. Abbott, R. Whear, L.R. Rodgers, A. Bethel, J.T. Coon, W. Kuyken, K. Stein, C. Dickens, Effectiveness of mindfulness-based stress reduction and mindfulness-based cognitive therapy in vascular disease: a systematic review and meta-analysis of randomized controlled trials, *J. Psychosom. Res.* 76 (2014) 341–351 <https://doi.org/10.1016/j.jpsychores.2014.02.012>.
- [3] M. Javnbakht, R. Hejazi Kenari, M. Ghasemi, Effects of yoga on depression and anxiety of women, *Compl. Ther. Clin. Pract.* 15 (2) (2009) 102–104 <https://doi.org/10.1016/j.ctcp.2009.01.003>.
- [4] S. Richardson, J.A. Shaffer, L. Falzon, D. Krupka, K.W. Davidson, D. Edmondson, Metaanalysis of perceived stress and its association with incident coronary heart disease, *Am. J. Cardiol.* 110 (2012) 1711–1716, <https://doi.org/10.1016/j.amjcard.2012.08.004>.
- [5] A. Rosengren, S. Hawken, S. Ounpuu, K. Sliwa, M. Zubaid, W.A. Almahmeed, et al., Association of psychosocial risk factors with risk of acute myocardial infarction in 11,119 cases and 13,648 controls from 52 countries (the INTERHEART study): case-control study, *Lancet* 364 (2004) 953–962, [https://doi.org/10.1016/S0140-6736\(04\)17019-0](https://doi.org/10.1016/S0140-6736(04)17019-0) 2004.
- [6] P. Nematollahi, M. Mehrabania, S. Karami-Mohajer, F. Dabaghzadeh, Effects of *Rosmarinus officinalis* L. on memory performance, anxiety, depression, and sleep quality in university students: a randomized clinical trial, *Compl. Ther. Clin. Pract.* 30 (2018) 24–28 <https://doi.org/10.1016/j.ctcp.2017.11.004>.
- [7] S. Pampallona, P. Bollini, G. Tibaldi, B. Kupelink, C. Munizza, Combined pharmacotherapy and psychological treatment for depression: a systematic review, *Arch. Gen. Psychiatr.* 61 (7) (2004) 714–719, <https://doi.org/10.1001/archpsyc.61.7.714>.
- [8] B. Kleiber, S. Jain, M.H. Trivedi, Depression and pain implications for symptomatic presentation and pharmacological treatments, *Psychiatry* 2 (5) (2005) 12–18.
- [9] M.M. Ohayon, A.F. Schatzberg, Using chronic pain to predict depressive morbidity in the general population, *Arch. Gen. Psychiatr.* 60 (1) (2003) 39–47 <https://doi.org/10.1001/archpsyc.60.1.39>.
- [10] H. Leventhal, D. Meyer, Nerenz, The common sense representation of illness/danger, in: S.J. Rachman (Ed.), *Contributions to Medical Psychology*, vol. 2, Pergamon, Oxford, 1980, pp. 7–30.
- [11] J. Kabat-Zinn, *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain and Illness*, Random House Publishing Group, New York: Delacorte, 1990, p. 720.
- [12] A.M. Velden, Kaylen, U. Wattar, C. Crane, K.J. Pallesen, J. Dahlgard, I.O. Fjorback, J. Piet, A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder, *Clin. Psychol. Rev.* 37 (2015) 26–39 <https://doi.org/10.1016/j.cpr.2015.02.001>.
- [13] B. Parkinson, M. Lawrence, E. McElhinney, J. Booth, Mindfulness for people with long-term conditions and their family caregivers: a systematic review, *Complementary Therapies in Clinical Practice*, In Press, Accepted Manuscript, 2018. <https://doi.org/10.1016/j.ctcp.2018.10.019>.
- [14] Z.V. Segal, J.M.G. Williams, J.F. Teasdale, *Mindfulness-based Cognitive Therapy for Depression: a New Approach to Preventing Relapse*, Guilford Press, New York, NY, US, 2002.
- [15] Z.V. Segal, Finding daylight: mindfulness recovery from depression, *Psychother. Networker* 32 (1) (2008) 13–22.
- [16] J. Gu, C. Strauss, R. Bond, K. Cavanagh, Corrigendum to “how do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies”, *Clin. Psychol. Rev.* 49 (2016) 119 <https://doi.org/10.1016/j.cpr.2015.01.006>.
- [17] S.L. Keng, M.J. Smoski, C.J. Robins, Effects of mindfulness on psychological health: a review of empirical studies, *Clin. Psychol. Rev.* 31 (2011) 1041–1056, <https://doi.org/10.1016/j.cpr.2011.04.006>.
- [18] C. Strauss, K. Cavanagh, A. Oliver, D. Pettman, Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: a meta-analysis of randomised controlled trials, *PLoS One* 9 (2014) e96110 <https://doi.org/10.1371/journal.pone.0096110>.
- [19] S.G. Hofmann, A.T. Sawyer, A.A. Witt, D. Oh, The effect of mindfulness-based therapy on anxiety and depression: a meta-analytic review, *J. Consult. Clin. Psychol.* 78 (2010) 169–183, <https://doi.org/10.1037/a0018555>.
- [20] J. Piet, E. Hougaard, The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: a systematic review and meta-analysis, *Clin. Psychol. Rev.* 31 (6) (2011) 1032–1040, <https://doi.org/10.1016/j.cpr.2011.05.002>.
- [21] M.P.J. Spijkerman, W.T.M. Pots, E.T. Bohlmeijer, Effectiveness of online mindfulness-based interventions in improving mental health: a review and meta-analysis of randomized controlled trials, *Clin. Psychol. Rev.* 45 (2016) 102–114 <https://doi.org/10.1016/j.cpr.2016.03.009>.
- [22] E. Smernoff, I. Mitnik, S. Lev-ari, The effects of Inquiry-Based Stress Reduction meditation technique on psychological well-being among a non-clinical sample, *Complementary Therapies in Clinical Practice*, In Press, Accepted Manuscript, 2018. <https://doi.org/10.1016/j.ctcp.2018.10.015>.
- [23] J. Dahl, T. Lundgren, Acceptance and commitment therapy (ACT) in the treatment of chronic pain, in: R.A. Baer (Ed.), *Mindfulness-based Treatment Approaches: Clinician's Guide to Evidence Base and Applications*, Elsevier Academic Press, San Diego, CA, US, 2006, pp. 285–306 <https://doi.org/10.1016/B978-0-12088519-0/50014-9>.
- [24] A. Kozak, Mindfulness in the management of chronic pain: conceptual and clinical considerations, *Tech. Reg. Anesth. Pain Manag.* 12 (2) (2008) 115–118 <https://doi.org/10.1053/j.trap.2008.01.007>.
- [25] J. Kabat-Zinn, An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results, *Gen. Hosp. Psychiatr.* 4 (1) (1982) 33–47 [https://doi.org/10.1016/0163-8343\(82\)90026-3](https://doi.org/10.1016/0163-8343(82)90026-3).
- [26] F. Zeidan, N.S. Gordon, J. Merchant, P. Goolkasian, The effects of brief mindfulness meditation training on experimentally induced pain, *J. Pain* 11 (3) (2010) 199–209 <https://doi.org/10.1016/j.jpain.2009.07.015>.
- [27] S.S. Katavić, S.F. Tanacković, B. Badurina, Illness perception and information behaviour of patients with rare chronic diseases, *Inf. Res.: An International Electronic Journal* 21 (1) (2016) 1–28.
- [28] D.C. Turk, R.J. Gatchel, *Psychological Approaches to Pain Management: a Practitioner's Handbook*, Guilford Publications, 2013.
- [29] K.C. Roberts, S. Danoff-Burg, Mindfulness and health behaviors: is paying attention good for you? *J. Am. Coll. Health* 59 (3) (2010) 165–173, <https://doi.org/10.1080/07448481.2010.484452>.
- [30] M.C. Davis, A.J. Zautra, L.D. Wolf, Mindfulness and cognitive-behavioral interventions for chronic pain: differential effects on daily pain reactivity and stress reactivity, *J. Consult. Clin. Psychol.* 83 (1) (2014) 24–35 <https://doi.org/10.1037/a0038200>.
- [31] F. Panahi, M. Faramarzi, The effects of mindfulness-based cognitive therapy on depression and anxiety in women with premenstrual syndrome, *Depression Research and Treatment* (4) (2016) 1–7 <https://doi.org/10.1155/2016/9816481>.
- [32] M. Sado, S. Park, A. Ninomiya, Y. Sato, D. Fujisawa, J. Shirahase, M. Mimura, Feasibility study of mindfulness-based cognitive therapy for anxiety disorders in a Japanese setting, *BMC Res. Notes* 11 (2018) 653 <https://doi.org/10.1186/s13104-018-3744-4>.
- [33] B. Shulman, R. Dueck, D. Ryan, G. Breau, I. Sadowski, S. Misri, Feasibility of a mindfulness-based cognitive therapy group intervention as an adjunctive treatment for postpartum depression and anxiety, *J. Affect. Disord.* 235 (2018) 61–67 <https://doi.org/10.1016/j.jad.2017.12.065>.
- [34] S.C. Hayes, J.B. Luoma, F.W. Bond, A. Masuda, J. Lillis, Acceptance and commitment therapy: model, processes and outcomes, *Behav. Res. Ther.* 44 (2006) 1–25 https://scholarworks.gsu.edu/psych_facpub/101.
- [35] Z. Costa, T. DiDonna, A. Rusilka, Correlational relationship between organizational self-efficacy and organizational self-esteem, *International Journal of Scientific and Research Publications* 7 (2) (2017) 1–9.
- [36] S. Hill, The Illness Perceptions Questionnaire-revised (IPQ-R), Keele University, England, 2010 [https://doi.org/10.1016/S1836-9553\(10\)70062-X](https://doi.org/10.1016/S1836-9553(10)70062-X).
- [37] S.T. Mason, L.L. Arceneaux, W. Abouhassan, D. Lauterbach, C. Seebach, J.A. Fauerbach, Confirmatory factor analysis of the short form McGill pain questionnaire with burn patients, *Eplasty* (2008) 8–54.
- [38] R. Moss-Morris, J. Weinman, K. Petrie, R. Horne, L. Cameron, D. Buick, et al., The revised illness perception questionnaire (IPQ-R), *Psychol. Health* 17 (1) (2002) 1–16, <https://doi.org/10.1080/08870440290001494>.
- [39] J. Upton, Illness perceptions questionnaire (IPQ-R), in: M.D. Gellman, J.R. Turner (Eds.), *Encyclopedia of Behavioral Medicine*, Springer, New York, NY, 2013.
- [40] G. Kuvačić, P. Fratini, J. Padulo, D.I. Antonio, A. De Giorgio, Effectiveness of yoga and educational intervention on disability, anxiety, depression, and pain in people with CLBP: a randomized controlled trial, *Compl. Ther. Clin. Pract.* 31 (2018) 262–267 <https://doi.org/10.1016/j.ctcp.2018.03.008>.
- [41] P.F. Lovibond, S.H. Lovibond, The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories, *Behav. Res. Ther.* 33 (3) (1995) 335–343 [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U).
- [42] J.M. Williams, W. Kuyken, Mindfulness-based cognitive therapy: a promising new approach to preventing depressive relapse, *Br. J. Psychiatr.* 200 (2012) 359–360, <https://doi.org/10.1192/bjp.bp.111.104745>.
- [43] R.A. Baer, Mindfulness training as a clinical intervention: a conceptual and empirical review, *Clin. Psychol. Sci. Pract.* 10 (2) (2003) 125–143 <https://doi.org/10.1093/clipsy.bpg015>.
- [44] N. Anderson, The Impact of Mindfulness Exercises on the Verbal Reactive Behaviors of Students Identified with Significant Behavioral and Emotional Difficulties, Theses and Dissertations (2017) 2462 <http://rdw.rowan.edu/etd/2462>.
- [45] K.W. Brown, R.M. Ryan, The benefits of being present: mindfulness and its role in psychological well-being, *J. Pers. Soc. Psychol.* 84 (4) (2003) 822–848 <https://doi.org/10.1037/0022-3514.84.4.822>.
- [46] D. Gilbert, J. Waltz, Mindfulness and health behaviors, *Mindfulness* 1 (4) (2010) 227–234 <https://doi.org/10.1007/s12671-010-0032-3>.
- [47] E. Salmoiraghi-Blotcher, M. Hunsinger, L. Morgan, D. Fischer, J. Carmody, Mindfulness-based StressReduction and change in health-related behaviors, *Cardiovascular Medicine Publications and Presentations*, vol. 87, 2013 https://scholarship.umassmed.edu/cardio_bp/87.
- [48] A.M. Hayes, G. Feldman, Clarifying the construct of mindfulness in the context of emotion regulation and the process of change in therapy, *Clin. Psychol. Sci. Pract.* 11 (3) (2004) 255–262 <https://doi.org/10.1093/clipsy.bph080>.
- [49] M.B. MacKenzie, N.L. Kocovski, Mindfulness-based cognitive therapy for depression: trends and developments, *Psychol. Res. Behav. Manag.* 9 (2016) 125–132, <https://doi.org/10.2147/PRBM.S63949>.
- [50] R.M. Ryan, E.L. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, *Am. Psychol.* 55 (1) (2000) 68–78, <https://doi.org/10.1037/0003-066X.55.1.68>.