



Effectiveness of Positive Mindfulness Therapy and Emotion-Focused Cognitive-Behavioral Therapy in Improving Pain Perception and Sleep Quality in Fibromyalgia Patients

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ABSTRACT

Aim: Pain is the most common mental pressure facing humans and one of the most common complaints among fibromyalgia patients. The present study aimed to investigate the effectiveness of Positive Mindfulness Therapy (PMT) and Emotion-Focused Cognitive-Behavioral Therapy (EFCBT) in improving pain perception and sleep quality in patients with fibromyalgia.

Method and Instruments: This study is a quasi-experimental research in which 60 referees who visiting Red Cross affiliated physiotherapy clinics in Tehran in 2020 were selected by convenience sampling and randomly divided into two experimental groups (positive mindfulness therapy and emotion-focused cognitive-behavioral therapy) and a control group (N= 20 individuals per each group). The research instruments included the Pittsburgh Sleep Quality Index (PSQI) and the McGill Pain Questionnaire (MPQ). Data were analyzed using SPSS software version 20.

Findings: The results showed that PMT produced significant improvements in pain perception ($P < 0.001$) and sleep quality ($P = 0.013$) in the patients compared to the control group. Furthermore, EFCBT was effective in improving pain perception ($P < 0.001$) and sleep quality ($P = 0.015$) in fibromyalgia patients. The results did not imply a significant difference between the two treatment interventions.

Conclusions: Using PMT and EFCBT are effective in attenuating pain perception and improving sleep quality in fibromyalgia patients.

Keywords: Fibromyalgia, Pain Perception, Sleep Quality, Mindfulness, Emotional Cognitive

Introduction

Based on the WHO's estimate, chronic diseases will be the leading cause of mortality and morbidity by 2025 and subsume two-third of all diseases. A surging number of chronic diseases in the health system will broaden governments' focus on the importance of effective self-control in managing chronic diseases [1]. Fibromyalgia is a prevalent debilitating syndrome characterized by widespread and multifaceted musculoskeletal pain, multiple and unstable pain-sensitive points, sleep disturbance, fatigue, and muscle inflexibility [2]. Widespread body pain is the prominent characteristic of the disease, which may be delineated by

such terms as sharp/burning, throbbing, aching/odd/deep, or tingling/numbness [3]. Fibromyalgia patients have lower pain tolerance than healthy individuals. Pain, particularly widespread odd and non-specific muscular pains, is the most common complaint in these patients. Fatigue, morning dryness, and headache are common in fibromyalgia patients [4]. Sleep, as one of the basic human needs, can cause psychological problems and reduce functionality when it is disturbed. The prevalence of sleep disturbances varies between 18% and 25% in the fibromyalgia population [5, 6]. Sleep disturbances are among

psychological disorders with considerable weight in evaluating general and clinical health. They have a wide range of direct and indirect effects on functional status, quality of life, and productivity of people. Every year, chronic insomnia, as a common type of sleep disturbance, affects many individuals and their interpersonal relationships within their families and community [7, 8]. Casey et al. [9] showed that the majority of sleep disturbances collocate with other psychological disorders, complicating the patients' condition; therefore, treating sleep disorders facilitates the improvement of accompanying psychological disorders. Zeichner et al. [10] reported that cognitive-behavioral disorders can improve sleep disturbances by 20%-40%.

Pain is the most important variable associated with fibromyalgia patients. The experience of pain is seen in either sensory or emotional fashions. The sensory and emotional dimensions reflect, respectively, the intensity of pain and the degree of unpleasant experience associated with it. Pain is probably the most common mental pressure facing humans and one of the most common complaints among patients [11, 12]. The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage [13].

In recent years and in line with psychological and spiritual factors related to pain and its outcomes, emotional regulation has been brought into theoretical and research fields as an important factor [14]. Among the approaches proposed by theorists, mental control is defined as similar to emotional control as a person's control over his/her mind. Obviously, some spiritual teachings emphasize that spirituality reflects the mental teachings affected by surrounding factors; however, it is regarded as an important part of many teachings. Evidence

shows the effectiveness of mental factors in improving disease and pain [12]. Kohrt et al. [15] showed the effectiveness of mental and spiritual factors in improving chronic pain. Kim et al. [16] showed the effectiveness of exercise (strength and flexibility exercises) and cognitive-behavioral interventions in attenuating chronic musculoskeletal conditions (fibromyalgia), improving performance, and changing secondary signs. Mohammadi Zeidi et al. [17] reported that training coping approaches, which are based on mental teachings, proved fruitful in enhancing health and easing clinical disorders.

By emphasizing self- and others-emotions identification skills (emotional awareness), proper expression of emotion based on social position (emotional understanding), reduction of negative emotions before triggering any response (emotional regulation), and cognitive-behavioral techniques, EFCBT can improve psychological symptoms, such as anxiety [18]. There is a recent surge in using this form of clinical interventions to improve psychological functions through combining and integrating traditional and religious exercises of mindfulness with common psychological techniques [19]. There are two forms of mindfulness-based clinical interventions, used extensively by researchers and clinicians: Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) [20, 21]. Based on the positive psychotherapy paradigm, these treatment interventions are not rejecting or substitute for traditional treatments. In other words, instead of undergoing a paradigm change, they intend to focus on strengths and weaknesses [22].

In fact, although some drug treatments have proven moderately fruitful in treating fibromyalgia, psychological treatments, such as Cognitive Behavioral Therapy (CBT), have

produced significant clinical improvement in the majority of these patients^[23]. As found in domestic literature, this is the first study on using EFCBT to treat fibromyalgia and the importance of comparing its effectiveness with that of common positive Mindfulness - Based Therapies (MBTs) in improving fibromyalgia. Accordingly, this study aimed to compare the effectiveness positive mindfulness therapy and emotion-focused cognitive-behavioral therapy in improving pain perception and sleep quality in patients with fibromyalgia.

Method and Materials

This study is a quasi-experimental research in which 60 referees who visiting Red Cross affiliated physiotherapy clinics in Tehran in 2020 were selected by convenience sampling and randomly divided into two experimental groups (positive mindfulness therapy and emotion-focused cognitive-behavioral therapy) and a control group (N= 20 individuals per each group). The inclusion criteria were fibromyalgia diagnosis, the age range of 30-50 years, and at least high-school education. Participants were randomly divided into two experimental groups (Positive Mindfulness Training (PMT) and Emotion-Focused Cognitive-Behavioral Therapy (EFCBT)) and a control group (n= 20 per group). After filling out the informed consent forms, the participants completed the McGill Pain Questionnaire (MPQ) and the Pittsburgh Sleep Quality Index (PSQI) in the pre-test stage. The participants were also ensured about the confidentiality of the results. After sampling, the intervention programs were performed separately for the experimental groups. During this period, the controls were not given any task to avoid probable interference with the results from the EFCBT and PMT groups. Harboring ethical considerations, a brochure containing

intervention guidelines was provided to the controls after the post-test phase. After the implementation of the interventions to the experimental group, both the experimental and control groups underwent the post-test phase.

Research Instruments

Pittsburgh Sleep Quality Index (PSQI): The PSQI was used to measure sleep quality. This questionnaire has 7 subscales which are: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. This questionnaire originally contains nine items; however, since item 5 is comprised of 10 secondary items, the questionnaire has 19 items in total, which are scored on a 4-point Likert scale from 0 to 3. Finally, the total score is used to evaluate sleep quality^[24]. Afkham Ebrahimi et al.^[25] reported alpha Cronbach coefficient of 0.89 for the questionnaire. In the present study, the Cronbach's alpha coefficient was 0.84 for the questionnaire.

McGill Pain Questionnaire (MPQ): This questionnaire consists of 20 statements to evaluate individuals' perception of pain in different dimensions (namely Sensory, Affective, Evaluative, and Miscellaneous). The McGill Pain Questionnaire (MPQ) contains two independent measures: Sensory measure that describes the experience of pain and affection measure that describes the emotional dimension of the experience of pain. Items 1-10, 11-15, 16, and 17-20 are, respectively, the sensory, affective, evaluative, and miscellaneous descriptors of pain^[26]. Khosravi et al.^[27] reported the total Cronbach's alpha coefficients of this questionnaire to be 0.85 and Cronbach's alpha coefficients of each component to be >0.85 in their research. In the present study, the Cronbach's alpha coefficient was 0.82 for the questionnaire.

Intervention program

Table 1) A summary of Positive Mindfulness Training (PMT) sessions

Session	Topic	Contents of training sessions	Homework
1	Self-awareness	Reviewing the structure and goals of the sessions and main rules; inviting the participant to introduce themselves; explaining depression and its psychological comorbidities; introducing mindfulness, self-consciousness, positive psychology, and meditation; acquainting members with a meditation that is focused on breathing, body, and emotion.	Keeping aware of thoughts and reactions throughout the day
2	Positive emotions	Discussing benefits of positive emotions and gratitude; implementing gratitude meditation focusing on who or what one appreciates	Expressing gratitude for positive situations
3	Self-compassion	Explaining the self-compassion concept, research review and methods to increase self-compassion; practicing loving kindness meditation focusing on self-compassion	Replacing internal criticism with statements of kindness
4	Self-efficacy	Introducing character strengths and self-efficacy including enhancement methods; Meditation focusing on a time when the participant was at his/her best and using character strengths	Completing the Values in Action (VIA) character strengths survey and using strengths
5	Autonomy	Introducing autonomy and its connection with well-being; practicing meditation on authentic self and action	Taking action in line with one's values and noticing external pressure on choices
6	Meaning	Discussing the meaning of life and wellbeing; completing writing exercise, entitled "The Best Possible Legacy Possible;" Meditation on the future vision of self, living one's best possible legacy	Taking action according to the best possible legacy and choosing meaningful activities
7	Positive relations with others	Discussing benefits of positive relations with others and methods for relationship enhancement; Loving-Kindness Meditation	Bringing feelings of loving kindness into interactions
8	Responsibility and Commitment	Commitment and enjoyment and their relationship with positive emotions; enjoyment-focused meditation	Enjoying engagement with experiences

The first intervention program consisted of eight 90-minute sessions of PMT ^[28]. (Table 1 presents summary of sessions). The second intervention program consisted of ten 90-minute sessions of EFCBT ^[29]. (Table 2 presents summary of sessions).

Data were analyzed at descriptive and inferential levels using SPSS version 20. The mean and standard deviation were used at the descriptive level. The Bonferroni post-hoc test and MANCOVA were used at the inferential level following investigating the presumptions of this analysis. Before conducting the MANCOVA, Shapiro-Wilk and Levene's test were used to assess, respectively, data normality and

homogeneity of variance; in addition, the equality of regression lines was investigated through examining the interaction between test and group membership.

Findings

The participants included 60 patients with fibromyalgia. The mean age of the participants in the mindfulness, cognitive-behavioral, and control groups were 43.3 ± 6.72 , 42.8 ± 7.08 , and 42.9 ± 5.86 years old, respectively. Table 3 shows the demographic variables of the participants in the experimental and control groups. Moreover, Table 4 shows the descriptive indices of the research variables in these

Table 2) A summary of Emotion-Focused Cognitive-Behavioral Therapy (EFCBT) sessions

Session	Topic	Educational Content
1	Introduction	Introducing the patient, implementing pre-test, determining treatment goals, presenting session rules, relationship therapy.
2	Relaxation	Introducing EFCBT, training relaxation technique, assigning a task.
3	Affective beliefs	Feedback from the previous session, taking note of negative and inefficient thoughts and beliefs, training relaxation technique, assigning a task.
4	Vertical Arrow Technique	Feedback from the previous session, training vertical downward arrow to identify central emotions and beliefs, training relaxation technique, assigning a task.
5	Affective beliefs	Feedback from the previous session, creating a complete list of emotional beliefs
6	Emotional judgments	Feedback from the previous session, test of clients' beliefs with objective analysis (judgment), training relaxation technique, assigning a task.
7	Evaluation of affective beliefs	Feedback from the previous session, using different cognitive analysis methods and encouraging clients to re-evaluate affective beliefs, training relaxation technique, assigning a task.
8	Affective thoughts	Feedback from the previous session, opposing autonomous affective thoughts, training relaxation technique, assigning a task.
9	Problem-solving	Feedback from the previous session, emphasizing identification of feelings; training problem-solving skills; describing various problem- and affection-centered coping styles, training relaxation technique, assigning a task.
10	Exercises	Feedback from the previous session, reviewing exercises throughout the sessions; implementing post-test; holding a closing session.

Table 3) Demographic variables of the participants in the experimental and control groups.

Groups	Mean \pm SD age (years)	Education			Marital status	
		Diploma	Bachelor degree	Master's degree	Married	Single
Mindfulness	43.3 \pm 6.72	30.00% (n=6)	40.00% (n=8)	30.00% (n=6)	70.00% (n=14)	30.00% (n=6)
Cognitive-behavioral	42.8 \pm 7.08	40.00% (n=8)	30.00% (n=6)	30.00% (n=6)	65.00% (n=13)	35.00% (n=7)
Control	42.9 \pm 5.86	40.00% (n=8)	30.00% (n=6)	30.00% (n=6)	75.00% (n=15)	25.00% (n=5)

SD: Standard deviation

three groups.

The Kolmogorov-Smirnov test was used to examine the assumed normality of data. Table 5 shows the results of the Kolmogorov-Smirnov test used to investigate the assumed normality of data. According to Table 5, the distribution of dependent variables, including pain perception and sleep quality,

was normal in both the pre-test and post-test phases, confirming the assumed normality of dependent variables ($P > 0.05$).

The Bonferroni post-hoc test was used to compare the effectiveness of PMT and EFCBT in pain perception and sleep quality of fibromyalgia patients. Table 6 shows the Bonferroni test results on the difference in

Table 4) Mean and standard deviation of dependent variables in the experimental and control groups in the pre-test and post-test

Dependent variable	Phases	PMT	EFCBT	Control	P-value
		M ± SD	M ± SD	M ± SD	
Pain perception	Pre-test	57.40 ± 5.20	59.40 ± 4.40	59.35 ± 4.30	0.142
	Post-test	50.30 ± 6.47	54.20 ± 4.30	58.80 ± 4.50	<0.001
P-value		<0.001	<0.001	0.342	
Sleep quality	Pre-test	11.40 ± 2.01	10.90 ± 1.50	10.95 ± 1.53	0.209
	Post-test	8.50 ± 2.06	8.50 ± 1.20	9.90 ± 2.40	<0.001
P-value		<0.001	<0.001	0.209	

PMT: Positive Mindfulness Therapy; EFCBT: Emotion-Focused Cognitive-Behavioral Therapy; M ± SD: Mean ± Standard Deviation

Table 5) The Kolmogorov-Smirnov test to examine the normality of research data

Phases	Variables	Test Value	P-value
Pre-test	Pain perception	1.11	0.17
	Sleep quality	0.79	0.56
Post-test	Pain perception	1.10	0.18
	Sleep quality	1.40	0.08

Table 6) Bonferroni post-hoc test for paired comparison of the variables in the post-test phase

Variable	Groups	Mean difference	SE	P-value
Pain perception	PMT – Control	-5.071	2.323	0.001
	EFCBT – Control	-3.982	2.412	0.001
	PMT – EFCBT	-1.089	2.189	0.586
Sleep quality	PMT – Control	-1.988	2.102	0.013
	EFCBT – Control	-1.402	2.016	0.015
	PMT – EFCBT	-0.586	2.219	0.999

PMT: Positive Mindfulness Therapy; EFCBT: Emotion-Focused Cognitive-Behavioral Therapy; SE: Standard Error

mean scores of the groups in pain perception and sleep quality in the post-test phase. According to Table 6, significant differences exist in the pain perception and sleep quality scores between the PMT and EFCBT groups with the control group ($P < 0.05$). PMT significantly reduced pain perception among patients with fibromyalgia ($P = 0.001$). The results also indicate that the PMT and

EFCBT significantly increased sleep quality in patients with fibromyalgia ($P < 0.05$). Table 5 did not show a significant difference between the experimental groups in pain perception. There was not any significant difference in the effectiveness of PMT and EFCBT in improving pain perception. There was not any significant difference in the mean score of sleep quality between the

experimental groups. There was not any significant difference in the effectiveness of PMT and EFCBT in improving sleep quality.

Discussion

The present study aimed to investigate the effectiveness of PMT and EFCBT in improving pain perception and sleep quality in patients with fibromyalgia. The results showed that PMT and EFCBT produced significant improvements in pain perception and sleep quality in the patients compared to the control group. It can be concluded that these intervention methods affected dependent variables. This finding is consistent with the results of Prados et al. [30] and Amutio et al. [31]. Emotion-focused therapy is concentrated on emotion scheme processes and sets emotional processing as its fundamental treatment goal. Using emotion-focused approaches can increase the use of positive emotion regulation approaches, thereby reducing the use of negative emotion regulation approaches [32]. This therapy contributes to enhancing emotional skills and forming an effective mental pattern and leads to transparency and emotional regulation by validating emotions.

Based on cognitive theories, bias is associated with various dysfunctional cognitions which, in turn, trigger maladaptive behavioral and emotional responses. Moreover, mindfulness-based therapy not only helps individuals discover deep senses of comfort and satisfaction, integrate them with daily life, and convert them into lifestyle, but also helps them to gradually get free from the states of worry, anxiety, fatigue, depression, and dissatisfaction. This approach believes that everyone undergoes periods of suffering and pain. A mindfulness-based approach turns these pain and suffering into empathetic suffering, which leads to the feeling of self-compassion and others-compassion;

whereas, these feelings of pain and suffering are experienced as exhausting emotions that are integrated with anger and helplessness [33]. It can thus be said that these techniques are effective in improving pain perception and sleep quality of fibromyalgia patients.

The results showed that there was not any significant difference between these treatment interventions in improving sleep quality and pain perception. The presence of the mind helps patients neutralize the development of the physical feelings and sensations at a suitable time through facilitating the identification of thought patterns. This way of awareness-raising enables patients to more clearly observe the development of rumination and negative reactions and then decentralize such patterns. Generally, a cognitive therapy premised on the presence of mind aims at enabling patients to harbor their thoughts only as pure thoughts and examinable mental events. It also enables them to separate the occurrence of negative mental events from responses they induce and finally change their meanings. In many cases, the pain is transient and responds to consolation with/without analgesics. When a psychological disorder is diagnosed, the attention should be shifted from pain symptomology and a suitable treatment should be implemented at the same time [34]. Therefore, it is hoped that the pain and the disease are eliminated together. Research limitations included the age range of 30-50 years, non-generalizability of the results to patients in other cities, and limited information of fibromyalgia patients.

Conclusion

According to the results, PMT and EFCBT are effective in attenuating pain perception and improving sleep quality in fibromyalgia patients. Moreover, there is not any significant difference in the effectiveness of these two treatment interventions. It is then

recommended to conduct this research on fibromyalgia patients. Future studies are recommended to have a follow-up stage. It is also recommended to hold PMT and EFCBT workshops to reduce pain and improve sleep quality.

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Authors' contribution

N J H: Study concept and design, acquisition of data, analysis and interpretation of data. P A: Administrative, technical, and material support, study supervision. F N. & A H: Critical revision of the manuscript for important intellectual content.

Conflicts of Interests

The author declares that there is no interest of conflict for this study.

Ethical permission

The study was approved by the Ethical Committee of Islamic Azad University-Ahvaz Branch (code: IR.IAU.AHVAAZ.REC.1400.031).

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