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Research Paper: The Effectiveness of Dialectical Behavior Therapy on Sleep Quality and Pain Management in Multiple Sclerosis

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ABSTRACT

Background: Pain can interfere with the daily functioning of patients with Multiple Sclerosis (MS). Furthermore, sleep disturbance is a common symptom of MS. The dialectical behavior therapy program is presented as a detailed structured treatment program that was demonstrated that has effects on the treatment of psychosomatic disorders such as pain and sleep disorders.

Objectives: To investigate the effectiveness of dialectical behavior therapy on sleep quality and pain management in patients with MS.

Materials & Methods: This research has been carried out as a quasi-experimental with pre-test, post-test, and a control group. A total of 24 people were selected through a convenient sampling method from the patients of the MS-Society of Guilan Province, Iran. Then, they are randomly divided into 2 equal groups (experimental and control). The study data were collected through Pittsburgh sleep quality scale and pain self-efficacy questionnaires. The intervention process was performed for the experimental group as 8 training sessions of 90 minutes long. The obtained data were analyzed by univariate analysis of covariance and multivariate analysis of covariance in SPSS V. 24.

Results: The results showed a significant difference between the experimental and control groups in terms of pain management (F=4.04) and sleep quality (F=5.64) (P<0.05) and dialectical behavior therapy had a significant statistical effect on sleep quality and pain management.

Conclusion: Based on these findings, dialectical behavior therapy can be used to improve the quality of sleep and manage pain in patients with MS.

Keywords: Dialectical behavior therapy, Pain management, Multiple sclerosis

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Highlights

- Dialectical behavior therapy has a significant effect on sleep quality in patients with multiple sclerosis.
- Dialectical behavior therapy has a significant effect on pain management in patients with multiple sclerosis.

Introduction

Multiple Sclerosis (MS) is one of the most common diseases of the central nervous system that is caused by the destruction of the myelin and also axons and causes functional disorders in various organs of the body as well as cognitive and mood disorders [1]. MS patients are affected by psychological symptoms such as depression, stress, anxiety, fatigue, and decreased quality of sleep. One of the complications of MS that leads to a severe loss of quality of life is impaired sleep quality and quantity [2]. Sleep disturbances are common in MS patients [3, 4].

Sleep quality is defined by mental indicators of how one experiences sleep and how one feels after waking up. Poor sleep quality leads to daytime sleepiness, mood swings, and increased risk of drug use. Patients are often unable to differentiate their feelings (fatigue and drowsiness) from energy loss due to sleep disorders. Patients with MS are more report insomnia and sleep disorders than healthy people [5]. Numerous studies have shown that MS patients have sleep-related problems, including insomnia, nocturnal movement disorders, irregular breathing in sleep, drowsiness, and rapid eye movement in sleep up to 54% higher than those in the general population [6]. In one study, sleep complaints in the group of MS patients were three times higher than those in the control group [7]. The causes of inadequate sleep in this disease are likely to be multifactorial and may be due to side effects of MS medications and immunosuppressive drugs or from symptoms associated with the disease such as depression, fatigue, and pain [6, 8]. And some studies showed that the course of the disease may be influenced by sleep quality [9].

Pain is a common phenomenon in patients with MS [10] and has been found to play an important role in their mental health and quality of life in such a way that greater pain intensity leads to poorer performance in most components of the mental health and social performance [11].

Pain is a sensory and psychological experience of discomfort that is usually associated with actual or threatening tissue damage [12]. Various psychological and environmental factors play a significant role in pain. Living with chronic pain requires significant emotional stress, which reduces the patient's emotional abilities and ultimately leads to the patient's demoralization, disappointment, helplessness, and depression [13].

Pain management is a multidisciplinary approach that has received much attention in recent years [14]. This approach involves addressing different aspects of pain and has been developed as an integrated model aimed at encouraging active participation and increasing coping capacity for pain control [14]. Because of the interaction between the mind and the body and the effects of the disease on the body's functioning, MS can lead to psychological symptoms and these psychological problems can exacerbate the course of MS disease.

Among the treatments that can have an impact on solving the problems of MS patients is dialectical behavior therapy. The dialectical behavior therapy program is presented as a detailed structured treatment program that makes it easier for therapists to use.

Dialectical behavioral intervention therapy is effective in the treatment of psychosomatic disorders such as pain disorders and eating disorders, especially nervous overeating [15], sleep disorders [16] and it has also been successful in the reduction of problems due to pain [17]. As people with MS have psychological and cognitive problems, this treatment may likely be effective in improving their problems. So in the present study, we aimed to investigate the effectiveness of dialectical behavior therapy on sleep quality and pain management in patients with MS.

Materials and Methods

This quasi-experimental research has a pre-test and post-test design with a control group. The statistical population of this study consisted of patients with MS who had referred to the MS Association of Guilan in the autumn and winter of 2018. The sampling was performed purposefully, and after selecting 30 individuals, 15 in-

dividuals were randomly assigned to the experimental group and 15 to the control group.

The inclusion criteria were aged between 20 and 45 years, literate, not in the critical level of the disease, not hospitalized due to mental illness, regular participation in therapeutic sessions, no drug addiction, and without hearing or speaking abnormalities. Any opposition to the above criteria, and not participating in the therapeutic sessions or using other psychotherapy methods during the research, resulted in exiting from the sampling process. During dialectical behavior therapy, three subjects were removed from the therapy process as a result of being absent in more than two sessions.

Measurement tools

The information in this research was collected through the following questionnaires.

Pittsburgh Sleep Quality Index (PSQI)

This questionnaire is a self-report instrument with a range of scores from 0 to 21 and is designed by Reynolds, Buysse, Cupfer, and Berman [18]. Retest reliability of this questionnaire was 0.87 [18]. In Iran, this questionnaire and its psychometric properties have been reported acceptable. The Cronbach homogeneity and α coefficient of this questionnaire in foreign research was 0.83 for its 7 components, which indicates its high validity. Domestically, this questionnaire was first translated into Persian by researchers and then translated back into English to confirm its accuracy. Its validity and reliability were confirmed and the Cronbach α coefficient was reported to be 0.87 to 0.82 [19]. Mokarami et al. reported the Cronbach α of 0.89 for this scale [20, 21]. In the present study, the Cronbach α coefficient of this questionnaire was reported to be 0.78.

The Pain Self-Efficacy Questionnaire

The Pain Self-Efficacy Questionnaire (PSEQ) is a 10-question questionnaire based on Bandura's theory of self-efficacy and was developed by Nicolas to evaluate the patient's belief in his ability to perform various activities despite the pain experienced [22]. Test validity coefficients of its Persian version were calculated by the Cronbach α, split-half, and test-retest methods as 0.81, 0.78, and 0.77, respectively, indicating satisfactory and desirable test reliability [22]. In the present study, the Cronbach α coefficient of this questionnaire was reported as 0.82. The research design was a pre-test-post-test with the control group.

The statistical population in this study comprised 257 MS patients who sought advice from the Rasht MS Association. The statistical sample included 50 MS patients who were diagnosed to have sleep and pain management problems based on the instrument of the research. Considering the inclusion and exclusion criteria, 30 patients were selected and divided into the experiment and control group through random sampling.

Table 1. Summary of the structure and content of dialectical behavioral therapy sessions of Matthew and Mckey

Sessions	Descriptions
1	Understanding the concept of mindfulness and the three mental states (rational mind, emotional mind, and wise mind) Objective: Introducing mindfulness generally and its various states
2	Teaching two sets of skills to achieve mindfulness: the first set was what skills and the second set was how. Objective: Teaching conscious attention skills
3	Self-relaxation skills using the five senses Objective: Enhancing mindfulness (awareness) skills
4	Training on identifying and tagging emotions that leads to increased control of emotions Objective: Adjusting emotions
5	Training positive short-term emotional experiences Purpose: Adjusting emotions
6	Teaching communication skills, including situational description skills, feelings expression, asking, self-confidence and negotiation techniques Objective: Interpersonal efficacy
7	Teaching attention deflection skills, presenting listening exercises to music which was contrary to the subjects' feelings Objective: Teaching distress tolerance
8	Explaining the functional role of emotions in life Objective: Tolerating distress

Procedure and duration of treatment intervention sessions

This treatment of dialectical behavioral therapy was designed by Mckey and Matthew [23] (Table 1).

Intervention process

After specifying the number of samples, they were placed into the experimental and control groups. After expressing the objectives of the study, the subjects gave consent to participate in the study. Initially, both groups were asked to complete the Petersburg sleep quality and pain self-efficacy questionnaire (PSEQ) carefully. The treatment method was consisted of 8 90-minute weekly sessions and was administered individually by the psychologist at the Andishe Nik and Ariana Psychological and Counseling Services in Rasht, Guilan Province, Iran. After the treatment period, the treatment and control groups completed the post-test, and then the data were analyzed by multivariate analysis of variance.

3. Results

The Mean±SD of ages of the dialectical behavior therapy and control groups were 35.17±7.54 and 34.75±7.75 years, respectively.

As shown in Table 2, the Mean±SD of pre-test pain index in the control group was 2.75±0.75 and it was 1.25±1.28 in the dialectical behavior therapy group. The post-test pain index was 4.5±1.24 in the control group and it was 2.75±0.75 in the dialectical behavior therapy group.

As shown in Table 3, the Mean±SD of the sleep quality index of the pre-test (and post-test) groups were 13.17±13.5 and 13.83±4.08, respectively.

To test assumptions of multivariable parametric covariance analysis, we used the Ljung–Box test. According to the Box test, which was not significant for all the variables, the homogeneity of variance / covariance matrices was correctly done (P=0.82, F=0.707, Box=17.22). Based on the Ljung test, for post-test steps and its lack of significance for all variables, the condition of inter-group variances was observed. Also, the normal distribution of

Table 2. Pre-test and post-test pain management index in dialectical and control groups

Variables		Mean±SD		K-S z-score*	P
		Control Group	Dialectical Group		
Pain management index	Pre-test	2.75±0.75	1.25±1.28	1.03	0.23
	Post-test	4.5±1.24	2.75±0.75	1.07	0.25

*K-S: The Kolmogorov–Smirnov test.

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Table 3. Pre-test and post-test of sleep quality index in dialectical and control groups

Variables		Mean±SD		K-S z-score	P
		Control Group	Dialectical Group		
Sleep quality	Pre-test	13.17±2.12	13.83±2.55	0.96	0.31
	Post-test	13.5±2.15	4.08±2.19	0.73	0.65

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Table 4. One-way analysis of variance (ANOVA) on post-test scores by controlling the pre-tests of dependent variables

Variables	Dependent Variable	Sum of Squares	df	Mean Squares	F	P	Eta2
Pre-test	Pain management	46.75	1	46.75	77.23	0.0	0.72
	Sleep quality	338.88	1	338.88	56.7	0.0	0.65
Group	Pain management	4.89	2	2.44	4.04	0.028	0.21
	Sleep quality	67.43	2	33.71	5.64	0.008	0.27

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Table 5. Adjusted Mean and Standard Error of pain management and sleep quality in post-test

Studied Variables	Mean±Standard Error		P
	Dialectical	Control	
Pain management	4.96±0.41	2.31±0.32	0.00
Sleep quality	4.55±1.24	13.9±0.97	0.00

variables was evaluated by the Kolmogorov-Smirnov test, which was not significant in the range of 1.40>KS-z>0.58 and thus, the distribution of variables follows the normal one. The variables of pain management and sleep quality had a linear relationship with the relevant covariates. So this assumption was met.

In Table 4, the results showed a significant difference (P<0.05) between the experimental and control groups in pain management (F=4.04) and sleep quality (F=5.64).

As shown in Table 5, the adjusted means in patients with multiple sclerosis were significantly higher in the experimental group than those in the control group (P<0.05).

Discussion

This study aimed to investigate the effectiveness of dialectical behavior therapy on sleep quality and pain management in patients with MS. Results showed that dialectical behavior therapy was effective in sleep quality and pain management in patients with MS and led to an increase in the experimental group compared to the control group. These findings are consistent with the results of the research [24, 25]. Since there are not many kinds of research done directly on this variable; research on mindfulness, which is of the components of dialectical behavior therapy on sleep quality, is reported. The results of the present study related to sleep quality are consistent with the findings of some other studies [26-31]. Mindfulness leads to improved sleep quality [32] and enjoyment of life and reduced physical symptoms. Kabat Zin argued that there was a direct relationship between the principle of letting go and sleep. He believed that for a person to fall asleep, he must have the ability to let go. Also, mindfulness exercises increase one's ability to let go and feel free [33]. Ong et al. reported that people with poor sleep quality had higher levels of mind rumination before bedtime [34]. Attending a mindfulness course helps in communicating with emotions, controlling and directing attention, lacking judgment on thoughts and feelings, and accepting experiences, through reducing the distressing thoughts of patients with MS. Also, mindfulness techniques, such as body monitoring, improve patients' emotion recognition status, and indirectly results in a better understanding of symptoms and reduce unrealistic judgments of the patient's thoughts about himself or herself, thereby enhancing the recovery process [35].

Other results of this study were that dialectical behavior therapy increased pain management in patients with MS. The results were consistent with research findings showing that dialectical behavior therapy techniques reduce pain problems. Linten investigated the efficacy and effectiveness of dialectical behavioral therapy in the reduction of pain in patients with chronic pain and found that this treatment can reduce pain in patients with chronic pain due to emotion regulation techniques [36]. In another study, Leilabadi et al. found that dialectical behavior therapy could have a significant effect on the sensory dimension of pain, emotional dimension of pain, total pain score, pain assessment dimension, and various pain dimensions [37]. Also, Sturgeon showed that dialectical behavior therapy had a significant effect on emotion regulation and thus tolerance. Their findings showed that emotion regulation training was effective in pain and this mechanism reduced pain in patients with chronic pain [38]. Figenbam et al. showed that training techniques based on dialectical behavior therapy led to a reduction in feeling pain like a disaster, fear of movement, and greater acceptance of pain in a patient with chronic muscle pain [39]. Many psychosocial and social factors can affect the severity of pain. Emotional regulation and its components directly affect the severity, frequency, and duration of the pain perception period [40]. A common assumption in the research is that evaluating and regulating emotions are healthy and successful strategies and, in contrast suppressing emotion or unhelpful emotion has a detrimental effect.

How individuals adjust their emotions is related to the severity of pain and its adaptation and management.

Masdow in a study confirmed the role of suppression of emotions in increasing pain [41]. In another research, Hamilton et al. showed a relationship between emotional regulation, emotional intensity, and emotional response with pain intensity [40]. In other words, people with low emotional adjustment ability and high emotional intensity exhibit worse emotional responses when they experience pain. Gilliam et al. also showed that people who scored higher on the pain catastrophizing scale which means mind rumination and helplessness subscale were more likely to suppress unwanted thoughts and emotions and perceived pain more [42]. Bashnell et al. in their research showed that using emotion-focused therapeutic strategies reduced the pain experienced by patients and increased their ability to perform their daily activities [43]. The emotion regulation process leads to the modification of pain-related behaviors because these behaviors in response to a negative emotion such as pain indicate unsuccessful emotion regulation in patients with chronic pain [44]. In this study, the MS patients who had pain were helped to avoid previous behaviors such as resting, staying, and doing nothing or delegating their work to others and avoiding physical activity. Instead, they were encouraged to start doing activities like entertaining themselves with daily activities, going to parties, or exercising, and walking when they feel less pain and get able to control and manage their pain and get out of the do-nothing cycle.

Studies on mindfulness treatments, which is another dialectical behavior therapy technique, show that this treatment affects pain self-efficacy [45] and pain reduction [46]. In their research, Perlman et al. showed that mindfulness-based interventions for patients with pain disorder affect emotional regulation mechanisms and subsequently on pain perception. One of the most important skills of the distress tolerance technique is turning attention. Teaching this skill helps the patients when experiencing negative emotions, such as pain, focus on activities that are fun and enjoyable, and entertain themselves to reduce pain and subsequently manage it [47]. Geranmaye et al. in their study concluded that mindfulness training based on stress reduction was effective on the severity of physical symptoms in MS patients [48]. Also, Francisco et al. in a study showed the positive effect of improving physical symptoms and psychological well-being after group mindfulness training in patients with MS [49].

According to Bauer, prolonged exposure to feelings of chronic pain in the absence of catastrophic thoughts (or lack of thought judgment) leads to desensitization to these feelings and a decrease in emotional responses at the same time [50]. Teaching mindfulness techniques also helps people to focus on their thoughts and emotions as an observer rather than controlling their attention. Also, compared to behavioral techniques, mindfulness requires accepting these experiences without trying to change, deny, or modify them, and mindfulness happens in a context of acceptance and change [51]. Accepting that nothing changes and then focusing on altering what can be changed, leads to flexibility in the behavioral responses of patients with MS towards experiences of pain. Also, according to the cognitive-behavioral perspective which is the basis of dialectical behavior therapy, by reducing pain-related emotions, thoughts, and behaviors, the pain decreases.

One of the limitations of this study was the impossibility of follow-up to evaluate the long-term effects of therapeutic methods. Also, caution should be taken in generalizing the findings because of the limited number of samples.

Conclusion

Positive psychotherapy and dialectical behavior therapy in patients with MS can be effective in managing pain and sleep quality of the patients with MS. Due to the prevalence of the disease among young people and the various effects that this disease has on people with multiple sclerosis, and the use of treatment methods and improving pain management, sleep quality, can be from the use of chemical drugs or staying in bed. And prevent patients from becoming disabled. Therefore, the results of this study can support the use of positive psychotherapy and dialectical behavior therapy to manage pain and improve psychological variables and quality of life.

Ethical Considerations

Compliance with ethical guidelines

The study protocol was approved by the Ethics Committee of Guilan University of Medical Sciences (No. IR.GUMS.REC.1397.500).

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Authors' contributions

Conceptualization, supervision, and writing the original draft: Mohammad Nrimani, Marie Abdolghaderi; Investigation and methodology: Mohammad Narimani, Marie Abdolghaderi, Abbas Abolghasemi, Hamid Reza Hatamian, Akbar Atadokht, Mosa Kafie, and Hamid Reza Ghalyanichi Langroodi; Writing, review, and edit-

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Conflict of interest

The authors declared no conflict of interest.

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