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Effect of Mindfulness-Based Therapy on Perceived Stress and Resilience in Patients with Multiple Sclerosis

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Abstract

Background and Aim: Multiple sclerosis (MS) is the third leading cause of neurological disabilities. It can profoundly affect daily activities of patients. People with chronic illnesses have different physiological, psychological, and emotional needs, and satisfying such needs is part of their treatment. This study aimed to assess the effect of mindfulness-based therapy on perceived stress and resilience in patients with MS.
Materials and Methods: This quasi-experimental study had a pre-test/post-test design with a control group. The study population comprised of MS patients referred to the Iranian MS Association in 2020. Thirty eligible patients were selected and randomly allocated to the intervention and control groups. The intervention group received mindfulness therapy through eight 1-hour sessions according to the protocol by Segal et al (1995). Before and after the intervention, both groups filled out the Perceived Stress Cohen and Connor-Davidson Resilience Scale. The obtained data were analyzed by SPSS 23 ($P<0.05$).
Results: Mindfulness-based therapy positively and significantly affected the perceived stress and resilience of MS patients ($P=0.001$).
Conclusion: According to the present results and the difference between the mean pre-test/post-test scores of perceived stress and resilience of MS patients, mindfulness-based stress reduction methods significantly improved the resilience and perceived stress in MS patients. Therefore, this treatment may be recommended to reduce the psychological problems of MS patients.
Keywords: Mindfulness-Based Therapy; Perceived Stress; Resilience; Multiple Sclerosis

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Introduction

Multiple sclerosis (MS) is a chronic progressive disease of the central nervous system that profoundly affects the patients' daily activities [1]. MS usually appears in stressful situations such as marriage, choosing a job, etc. Stress leads to aggravation and progression of MS [2]. Depression and anxiety are common symptoms of MS and have a significant negative impact on the quality of life of patients, limit their functions, and impose heavy costs on them and their families [3]. The prevalence of MS varies in different populations; it has an annual mean prevalence of 1.5 to 11 cases in every 100,000 individuals, and this trend is still increasing. Studies conducted in the Middle East and Iran during the recent years showed that the prevalence of MS was relatively high and increasing in these areas [2]. According to the latest official statistics of the Iranian MS Association in 2019, 72,000 individuals in Iran are suffering from MS, and there are 5,000 new cases annually, with the prevalence of MS being three times higher in women, compared with men. This report also showed that Tehran and Isfahan had higher number of MS cases than other provinces. Compared with the Middle East, the prevalence of MS is high in Iran. However, compared to the European countries and the United States, Iran has a lower morbidity rate [4]. Research shows high rate of depression and distress, anxiety, low quality of life, and lower well-being in MS patients. Nonetheless, the role of social relationships in these patients is prominent [3]. These psychological symptoms could be directly due to the effects of inflammation and destruction of the nerve sheaths, in addition to the disabilities and psychosocial issues associated with this chronic, debilitating disease, with unknown cause and prognosis, and unpredictable relapse periods [5].

Perceived stress is a psychological state or process during which a person threateningly perceives his physical and psychological well-being. Perceived stress depends on how a person understands the situation and accidents [6]. In the last few decades, stress has been one of the most prevalent and most important psychological problems [7], and is among the factors that have a great impact on individual and social life and progress of a person. People with high levels of stress experience fatigue, helplessness, anxiety, and vulnerability. Individuals who are under a lot of stress often state that they have experienced a reduction in self-confidence [1]. They are under stress, cannot seriously pursue their goals and lose hope when there

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is an obstacle [8]. Nauta et al, [9] and Abasii et al. [2] showed that cognitive and emotional regulation strategies reduce the perceived stress in individuals, as cognitive answers to emotional-based events that consciously or unconsciously regulate the emotional experiences or interpretation of events by different individuals. Emotional regulation includes a wide range of cognitive, behavioral, emotional, and physiological responses, and is necessary for understanding of emotional and behavioral correlates of stress and negative emotional states [8]. Emotional regulation is a basic principle in initiating, evaluating, and organizing adaptive behaviors as well as preventing negative emotions and incompatible behaviors [10].

Resilience is how to withstand stress or injury. The resilience theory is based on strong aspects of dealing with injuries and the ability of an individual to overcome danger and problems [11]. Resilience is the process, ability, or outcome of successfully adapting to stressful and challenging circumstances [12].

Cognitive-behavioral therapy is one of the most effective therapeutic interventions for patients with MS. However, studies on this topic are scarce. Thus, interventional studies are required on the effectiveness of non-pharmacological treatments for MS [2]. Mindfulness is a therapeutic approach that is a combination of relaxation and a unique cognitive component. The cognitive basis of this approach is the theory of cognitive subsystems [13]. According to Kabat-Zinn [14], mindfulness, in its simplest form, is awareness of what is happening in the present moment and is a multidimensional instrument with proven operationalizing difficulty and contains concepts such as non-judging, acceptance, awareness of the present moment, lack of automatic reaction, paying attention and intentionality. These components must be present to experience mindfulness [15]. Mindfulness has several important attitudes, the major of which are acceptance, non-judgment, tolerance, non-struggle, letting go, beginner's mind, gratitude, and generosity [16]. Studies have shown that mindfulness helps people to control negative behavioral patterns, automatic thoughts [17], and positive health behaviors [18]. In other words, through the combination of vitality and clear vision experiences, mindfulness can make positive changes in resilience and well-being [19]. Research has shown that mindfulness meditation improves mood and its short-term training reduces fatigue and anxiety in cancer patients [20]. Mindfulness-based therapy affects depression, anxiety, and mental adjustment [21]. The mindfulness-based

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therapy improves symptoms of stress, anxiety, and self-esteem [22]. This study aimed to assess the effect of mindfulness-based therapy on perceived stress and resilience of MS patients referred to the Iran MS association in 2020.

Methods

This quasi-experimental study was performed with a pretest-posttest design and a control group. Mindfulness-based therapy was considered as an independent variable that affects the intervention group, and the control group received the routine treatment. Patients with MS who were referred to the Iran MS Association in 2020 comprised the study population. The inclusion criteria included absence of comorbid psychiatric disorders (as self-reported) and having a medical record in the MS Association. If they did not want to continue the treatment sessions or missed more than two sessions, they were excluded from the study. The sample size was calculated to be 20 patients with 95% confidence interval (Z=1.96, P=0.05, and d=0.05) using the following formula: $N = \frac{z^2 p(1-p)}{d^2}$

Also, considering the potential loss of patients during the intervention period, the sample size increased to 30 patients (n=15 in each of the intervention and control group). Thus, 30 MS patients were enrolled [23]. The patients were divided into two groups (n=15) of intervention and control and were asked to complete the questionnaires. Next, the participants in the intervention group underwent mindfulness-based therapy by Segal et al (1995) (1) for 8 sessions, 60 minutes each (the session contents are shown in Table 1). The participants in the intervention group (n=15) were subdivided into 3 groups of 5 (based on feasibility of implementation), and were taught mindfulness for one session per week, preferably at the end of the week (after making an arrangement). The first and second authors had already passed a mindfulness-based therapy training. Considering the simultaneous occurrence of sampling and the COVID-19 outbreak, meetings were held virtually through WhatsApp. Additional information was provided through slides, recorded audio files, and over the phone, if necessary. The participants in both the intervention and control groups completed the questionnaires immediately after the end of the training course. The mindfulness-based therapy protocol was also given to the control group after the post-test.

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Table 1. Summary of mindfulness therapy sessions

Session	Summary of the session content
First	Introduction of group members and therapist, discussing the goals, and rules of the course, explanation of thinking, feeling, and behavior
Second	Fundamental principles of mindfulness and the concept of acceptance
Third	Cognitive dissonance and metaphors
Forth	The context of self-concept and metaphors
Fifth	Contact with the moment of life and examples
Sixth	Values and setting related examples
Seventh	Adherence and mindfulness
Eighth	Summarizing and reviewing the sessions and repeating metaphors

The tools used in this study for data collection were as follows:

Perceived stress: The perceived stress questionnaire was created by Cohen et al in 1983[7] to measure the general stress perceived in the past month and has 3 versions, each having 4, 10, and 14 items. It measures the thoughts and feelings about stressful events, control, overcoming obstacles, and coping with psychological pressure and stress. Also, this scale examines the risk factors in behavioral disorders and shows the process of tense relationships. In this study, the 14-item version of this questionnaire was used. The scoring system of the questionnaire is based on a 5-point Likert scale, from never=zero to very often=4 points. Statements 4, 5, 6, 7, 9, 10, and 13 are scored inversely. The lowest score is zero, the highest score is 56, and a higher score indicates higher level of perceived stress. The validity and reliability of the perceived stress questionnaire have been previously confirmed in Iran [24,25].

Resilience: The Connor-Davidson Resilience Scale [26] has 25 items and measures a person's ability to resist pressure and threats. Each item is scored using a 5-point scale (not true at all to nearly always true) and is scored from 1 (not true at all) to 5 (nearly always true). Although this scale measures different aspects of resilience, it provides an overall score. Resilience subscales include self-perceived competence, trust in one’s instincts, tolerance of negative emotions, positive acceptance of change and secure relationships, and control and spiritual influences. Points range from 0 to 100, with higher scores indicating higher levels of resilience. To assess its reliability, its internal consistency was calculated and confirmed through Cronbach's alpha coefficient method (82%). The Connor-Davidson Resilience

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Scale has been previously used by many researchers in Iran [26,27].

After explaining the objectives of the study to the participants, written informed consent was obtained from them. In addition, the study was approved by the Ethics Council of Tehran Medical Sciences, Islamic Azad University with the ethics code ID: 162275012. Data analysis was done using SPSS version 23. The mean, standard deviation, and frequency values were reported as descriptive statistics. In the next step, the differences between the two groups before and after mindfulness-based therapy were analyzed by using covariance analysis(ANCOVA).

Results

According to the demographic results, 53% of the respondents were males. In terms of education, 23.3% of the participants had a high-school diploma, 26.6% had a Bachelor's degree, and out of a total of 32, 36.66% were unemployed or housewives, 26.66% were retired, 13.33% were employees, and 23.33% were businessmen. Table 2 demonstrates the mean and standard deviation of the scores of the patients' perceived stress.

Table 2. Mean and standard deviation of the perceived stress scores of patients in pre-test and post-test

Variable	Group	Pre-test mean	Post-test mean	Standard deviation of pre-test	Standard deviation of post-test
Perceived Stress	Intervention	46.53	41.66	2.46	1.43
	Control	47.61	48.60	2.19	2.20

As shown, the mean perceived stress score of the intervention group was 46.53 in the pre-test and 41.66 in the post-test. Also, the mean perceived stress score of the control group was 47.61 in pre-test, and 48.60 in post-test. In the intervention group, the amount of perceived stress decreased, thus, ANCOVA was done to assess the significance of this reduction (Table 3).

Table 3. Results of covariance analysis of perceived stress scores in the intervention and control groups

Source	Sum of squares	Degrees of Freedom	Mean squares	f	P
Pre-test	35.100	1	35.100	15.734	0.001
Group	292.819	1	292.819	131.259	0.001
Error	60.233	27	2.231		
Total	80133.000	30			

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Since the effect of the pre-test score (covariance variable) was significant, the assumption of correlation between the covariance variable and the dependent variable was met. Also, the group effect was significant. After eliminating the pre-test effect, there was a significant difference between the post-test mean scores of the intervention and control groups. Therefore, cognitive therapy based on mindfulness showed a significant effect on reducing the perceived stress of MS patients. Mindfulness-based cognitive therapy reduced the stress of MS patients.

Table 4 shows the mean and standard deviation of the patients' pre-test and post-test resilience scores.

Table 4. Mean and standard deviation of patients' pre-test and post-test resilience scores

Subscale	Group	Pre-test mean	Post-test mean	Standard deviation of pre-test	Standard deviation of post-test
Self-perceived competence	Intervention	25.27	30.20	3.53	2.70
	Control	24.75	25.14	3.24	3.11
Trust in one's instincts	Intervention	21.27	27.13	3.69	3.24
	Control	22.12	23.87	3.98	1.28
Tolerance of negative emotions	Intervention	16.53	19.28	2.32	1.28
	Control	16.98	17.12	2.36	2.13
Positive acceptance of change and secure relationships	Intervention	9.67	10.27	1.69	1.83
	Control	9.01	9.23	1.86	1.95
Control and spiritual influences	Intervention	6.42	7.16	1.40	1.36
	Control	5.97	5.88	1.65	1.56
Total resilience	Intervention	79.16	95.64	6.82	5.37
	Control	78.73	81.54	6.32	5.94

Table 5 shows the results of ANCOVA regarding the differences between the mean scores of the intervention and control groups in the post-test and assesses the significance of these differences.

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Table 5. Results of ANCOVA of resilience scores in the intervention and control groups

Source	Sum of squares	df	Mean squares	f	P
Self-perceived competence					
Pre-test	445.057	1	445.057	80.176	0.001
Group	35.039	1	35.039	6.312	0.018
Error	149.876	27	5.551		
Total	69823.000	30			
Trust in one's instincts					
Pre-test	540.186	1	540.186	417.870	0.001
Group	14.105	1	14.105	10.911	0.003
Error	27.147	27	1.293		
Total	116355.000	30			
Tolerance of negative emotions					
Pre-test	519.811	1	519.811	241.751	0.001
Group	12.937	1	12.937	6.016	0.021
Error	58.055	27	2.150		
Total	31324.000	30			
Positive acceptance of change and secure relationships					
Pre-test	56.292	1	56.292	3.975	0.001
Group	52.885	1	52.885	3.734	0.056
Error	382.375	27	14.162		
Total	48407.000	30			
Control and spiritual influences					
Pre-test	425.776	1	425.776	245.163	0.001
Group	2.889	1	2.889	1.664	0.208
Error	46.891	27	1.737		
Total	48356.000	30			
Total resilience					
Pre-test	3790.194	1	3790.194	4.469	0.033
Group	3425.774	1	3425.774	4.039	0.045
Error	2289.339	27	848.087		
Total	3496452.000	30			

The results of this study showed that mindfulness-based cognitive therapy had a significant effect on resilience of MS patients referred to the Iranian MS

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Association in 2020 and also improved the resilience of MS patients. Mindfulness-based cognitive therapy significantly increased trust in self-instincts, tolerance of negative emotions, and self-perceived competence of MS patients.

Discussion

The results of this study showed that mindfulness-based therapy had a positive and significant effect on perceived stress and resilience of MS patients referred to the Iranian MS Association in 2020. It was shown that the score of perceived stress in the intervention and control groups was 46.53 and 47.61, respectively (the highest score was 56) before the intervention. Taghilo et al. showed that there was a significant difference in the perceived stress score before the intervention between the two groups, which was opposite to the results of the present study [24]. In a study by Ghodspour et al, in 2018, the amount of perceived stress in the two groups did not differ significantly before the intervention, and the results of their study were similar to the results of the present study [28]. Mehrizi et al, also showed no difference in the pre-test perceived stress of the intervention group and the control group [29]. Also, the results of the present study revealed that the amount of perceived stress after the intervention in the intervention and control groups was 41.66 and 48.60, respectively, which was consistent with the results of the study by Taghilo et al. [24]. However, in the study by Ghodspour et al, in 2018, the amount of perceived stress after the intervention was higher in the intervention group than the control group [28]. Mehrizi et al. found that the amount of stress after the intervention in the intervention group was lower than that in the control group, thus, it was different from the present results [29]. A study by Farhadi et al, in 2017 showed that cognitive therapy based on mindfulness had a significant effect on reducing stress [30]. In 2019, Haji-Adineh et al, also showed that this treatment method had a significant effect on increasing life expectancy and reducing stress [31]. Also, Sanagoo Moharar et al, in 2019 showed that mindfulness-based cognitive therapy increased the problem-focused coping style and decreased the emotion-focused coping style of MS patients and also decreased depression and stress in them [32]. Aghajani and Samadifard in 2019 found a significant relationship between perceived stress and suicidal thoughts in male adolescents [25].

The present results indicated that the resilience of MS patients before mindfulness-based therapy in the

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intervention group (79.16) was not significantly different from that in the control group (78.73) and, it can be said that the resilience level was less than 50 (points ranged from 0 to 100, with higher scores indicating higher levels of resilience) in almost all dimensions in comparison to the intervention group. Nasirnejhad et al, in 2020 found that the level of resilience before the intervention was lower in experimental groups than in the control group, but this difference was not significant [26]. Some studies demonstrated that the amount of resilience before the intervention in the experimental group was lower than that in the control group [27,33-35]. However, Naseri Garagoun et al, in 2021 found that the amount of resilience before the intervention was higher in the experimental group than in the control group [36] which can reduce the accuracy of the obtained results, while in our study, the resilience of the two groups was almost similar before the intervention.

Moreover, the present results showed that the level of resilience after mindfulness-based therapy in the intervention group was higher than that in the control group, (95.64 and 81.54, respectively). It can be stated that resilience increased in all dimensions in the intervention group compared with the pre-test. The present results were similar to those of Nasirnejhad et al, Solati, and Akbari et al [26,27,33]. Consistent with the present study, Karimi Afshar et al, in 2018 and Mirmehdi and Razaali in 2019 indicated that resilience in the intervention group increased compared to the pre-test [34,35]. Naseri Garagoun et al, in their study conducted in 2021 on the effectiveness of stress reduction intervention based on mindfulness on resilience and life expectancy of patients with gastrointestinal cancers showed an increase in level of resilience of the intervention group compared with the pre-test, which was similar to the present findings [36].

Regarding the resilience subscales of control and spiritual influences, and positive acceptance of change and secure relationships, the results showed that after removing the effect of the pre-test score, there was no significant difference between the mean post-test scores of the intervention and control groups. It may be stated that cognitive therapy based on mindfulness did not have a significant effect on improving control and spiritual effects, and positive acceptance of change and secure relationships of MS patients.

The results of studies by Ghodspour et al, Maazinejad et al, Oraki and Sami, and

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Pagnini et al, who showed that mindfulness-based cognitive therapy was effective on resilience and psychological well-being of MS patients, and the present results were in line with the findings of the aforementioned studies [28,37-39]. Also, Dela Torre et al, in 2020 evaluated 30 patients with recurring MS, who underwent one year of mindfulness-based cognitive therapy. After one year, a significant improvement was noted in performance and endurance of patients, which was in line with the specific goals of the present study [40]. Evans et al, in 2016 showed that an 8-week protocol of mindfulness-based cognitive therapy was useful for patients with general anxiety disorder [41]. Nauta et al, in 2017 compared three methods of cognitive therapy based on the conscious mind and cognitive-behavioral method, and the usual method of drug treatment, and reported that those who underwent cognitive therapy based on the conscious mind had more resilience after treatment compared with the other two groups, but those in the cognitive-behavioral therapy group had higher life expectancy [9].

This study has some limitations such as the COVID pandemic and coordination problems for the sessions that led to delays in holding classes and lack of access to higher number of samples, which decreased the power of study and generalization of the results.

Conclusion

The results of this study showed that mindfulness-based therapy had a significant effect on reducing the perceived stress of MS patients. Also, mindfulness-based therapy had a significant effect on resilience (self-perceived competence, trust in self-instincts, and tolerance of negative emotions). This study revealed that mindfulness-based therapy did not have a significant effect on improving control and spiritual effects, and positive acceptance of change and secure relationships of MS patients. Therefore, mindfulness training can play an important role in reducing anxiety and stress. It should also be noted that increased attention and awareness towards thoughts, emotions and practical tendencies are among the positive aspects of mindfulness. Furthermore, it causes the coordination of adaptive behaviors and positive psychological states in any given field and even improves the ability of a person to become interested in individual and social activities. This treatment approach may be recommended to reduce psychological problems of MS patients.

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Conflicts of Interest

The authors declare no conflict of interests.

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