Journal of Fundamentals of Mental Health

Mashhad University of Medical Sciences

Psychiatry and Behavioral Sciences Research Center

Original Article **Open Access**

The effect of family-centered behavioral activation group training on psychological symptoms in patients with multiple sclerosis

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Abstract

Introduction: We aimed to assess the effect of family-centered behavioral activation group training on psychological symptoms in patients with Multiple Sclerosis (MS).

Materials and Methods: In this study, 40 MS patients in Torbat-e Jam City, Iran, in 2023-2024, were selected through the convenient sampling method and randomly assigned into experimental and control groups. The experimental group received eight 90-minute family-centered behavioral activation training sessions for 3 months. We used Depression Anxiety Stress Scale-21 (DASS-21) and the data were analyzed using variance analysis with repeated measurement.

Results: After the intervention, there was significant differences in depression ($P< 0.01$), anxiety ($P< 0.01$), and stress ($P< 0.01$) in the experimental group compared to the control group.

Conclusion: According to the results, family-centered behavioral activation training reduces psychological symptoms in MS patients. Therefore, behavioral activation is an effective intervention for improving the mental health of MS patients and can be integrated into the standard care of these patients.

Keywords: Behavioral activation, Family, Multiple sclerosis, Psychological symptoms

Please cite this paper as:
Yousefi Sh, Nayyeri M, Seirafi MR. The effect of family-centered behavioral activation group training on psychological symptoms in patients with multiple sclerosis. Journal of Fundamentals of Mental Health 2024 Nov-Dec; 26(6): 399-405. DOI: 10.22038/jfmh.2024.82354.3164

Introduction

Multiple Sclerosis (MS) is a chronic neurodegenerative disease of the central nervous system (1). It arises from complex interactions between genetic predispositions and environmental influences (2). Globally, around 2.5 million people (3), including over 70,000 in Iran (4), are affected by MS. They experience a wide range of symptoms such as motor weakness, vision disturbances, numbness, balance difficulties, tingling sensations, speech impairments, bowel and urinary dysfunctions, cognitive deficits, and paralysis (5). Physical disabilities significantly

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Received: Jul. 28, 2024
Accepted: Sep. 26, 2024

contribute to psychological and social challenges. Individuals with these disabilities require support to manage cognitive, psychological, and social issues to improve their quality of life (6). Patients with chronic inflammatory and autoimmune conditions are three to four times more likely to develop neuropsychiatric disorders, particularly depression and major depressive disorder (2). Research indicates that the prevalence of depression and anxiety symptoms in MS patients ranges from 14-54% and 14-41%, respectively (7). Neuropathic pain is linked to anxiety and is a common symptom of MS, highlighting the severity of disease (8).

Additionally, 25-50% of MS patients experience depression during their lifetime. The high prevalence of depression in MS patients is likely a direct result of chronic innate immune system activation in brain areas related to function (9). MS patients have reported that psychological stress can worsen their symptoms, so, managing life stressors and limiting their effects can delay the onset and exacerbation of MS. While, stress management does not cure MS, it plays a crucial role in reducing its symptoms and severity (10). Advancements in medical treatments for MS and the management of comorbidities often diagnosed in MS patients have led to an increase in prevalence due to longer life expectancy and an aging population. Structured and multidisciplinary rehabilitation programs are essential to address the burden of symptoms and disability associated with MS and its comorbidities (11). One effective approach to improving life quality in people with MS is through patient education. This involves providing information and teaching skills to help individuals manage the disease and improve their health outcomes. Applying behavioral sciences to identify barriers and facilitators can explain change mechanisms and assist health professionals in behavior change. Behavioral activation is a psychological therapy focused on behavior, helping individuals engage in more valuable (intrinsically rewarding) activities in a structured and achievable way to improve mood (12). It is an effective psychotherapy for treating subthreshold depression, aiming to increase behavior based on individual values and restore an environment characterized by diverse and sustainable sources of positive reinforcement. This system is also associated with positive emotions such as hope, joy, and pleasure (13).

In certain care programs for individuals with multiple sclerosis, behavioral health professionals incorporate elements of behavioral activation to assist patients in planning enjoyable activities alongside managing medications and other psychological symptoms. The primary focus of behavioral activation therapy is on modifying behavior (14). Given that patients with multiple sclerosis often face numerous interpersonal and psychological challenges, including depression, anxiety, and stress, due to the use of multiple medications, this study aims to improve their physical health and quality of life.

Materials and Methods

The statistical population of this clinical trial included all patients diagnosed with multiple sclerosis in Torbat-e Jam City, Iran, in 2023-2024, based on the diagnosis of a neurologist, met the diagnostic criteria for multiple sclerosis and have established a medical file with a specialist doctor. Based on the G*Power software with a power of 80, an effect size of 0.38, an error of 0.05, and a repeated measures ANOVA test, the sample size has been set to 40. Inclusion criteria included a diagnosis of multiple sclerosis by a neurologist or patients who had previously been treated by a neurologist, a minimum of 3 months since the diagnosis, no comorbidity with other diseases, aged 20 to 55 years, and having an informed consent form. Exclusion criteria included missing more than two therapy sessions, withdrawal, and psychological treatments during the study.

Forty individuals were selected through the convenient method and randomly assigned into experimental (patients and their close family members) and control groups. Initially, the questionnaire was administered to both groups. After three months, (eight 90-minute group training sessions) a post-test was administered to both groups, and finally, months later, the questionnaire was collected from the study participants for follow-up.

Research instruments

A) Depression Anxiety Stress Scale-21 (DASS-21): This scale was developed by Lovibond and Lovibond and includes 21 items. There are seven items in each of the depression (items 3,

5, 10, 13, 16, 17, and 21), anxiety (items 2, 4, 7, 9, 15, 19, and 20), and stress (items 1, 6, 8, 11, 12, 14, and 18). The degree to which respondents endorsed the symptoms over the last week is rated on a scale that ranges from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). The correlations between the depression subscale and the Beck Depression Inventory were 0.70, the anxiety subscale and the Zung Anxiety Scale were 0.67, and the stress subscale and the Perceived Stress Scale were 0.49 (15). The Cronbach's alpha coefficients were 0.88 for depression, 0.82 for anxiety, 0.90 for stress, and 0.93 for the total scale (16).

We used the treatment panel, which is derived from the behavioral activation model by Canter, Busch, and Rusch (17).

Table 1. The structure of behavioral activation family-centered sessions

Number of sessions	Summary of the session
1	Introduction, acquaintance, norms and group process, implementation of behavioral contracts, introduction to the model and behavioral activation therapy
2	Familiarity with the disease, risk factors of multiple sclerosis, and psychological factors in the family environment, understanding depression, anxiety, and stress: symptoms and signs of depression, anxiety, and stress, the impact of multiple sclerosis on mental health, methods of screening for depression, anxiety, and stress, starting daily activity recording
3	Review of assignments, psychological symptoms and their role in multiple sclerosis, their impact on the family, training the patient to protect their family from depression, anxiety, and stress caused by the disease, how to control emotions and moods when dealing with the family, giving a sense of worth, reconstructing behaviors that emerge following psychological symptoms, identifying barriers to enjoyable and enhancing activities, performing enjoyable activities, reviewing practice assignments
4	Review of assignments, planning techniques, setting realistic goals, prioritizing activities, training and practicing time management techniques for the patient and family, practicing skills related to the patient's self-efficacy and successful interaction with the family, including how to perform exercises, physical activities, and proper diet, giving assignments
5	Review of assignments, steps of problem-solving, solving issues related to depression, anxiety, and stress in patients with multiple sclerosis with the participation of the patient and family, determining the role of a healthy family member for patients and how to behave normally with the family and practice it, focusing on cognitive states and judgments and controlling them, managing patients' stress, identifying lifestyle, stress, and negative thoughts, adapting to stress and predicting, identifying and preventing negative consequences and irrational attitudes, reconstructing the consequences of stress and anxiety in patients, training essentials for relieving anxiety and stress, problem-solving ability and relieving stress, and how to use flexible coping
6	Review of assignments, reviewing previous assignments and teaching motivation enhancement techniques, self-rewarding, the role of the family in enhancing the patient's motivation, discussing topics related to hope and optimism and creating connections between family members, using positive verbal reinforcement through hope therapy and using positive and hopeful sentences about patients' small progress, teaching response styles and how they relate to love and attachment and the role of these components in the family
7	Reviewing the previous session, relaxation techniques: deep breathing, meditation, muscle relaxation, teaching relaxation techniques to the patient and family, creating a sense of usefulness and empowerment in the family, and changing moods and psychological states through hierarchical improvement, in the form of group discussion
8	Review of assignments, summarizing the sessions, providing a brief treatment summary, conceptualizing a complete life and offering a program based on the techniques and topics of previous sessions, providing follow-up strategies related to reducing the psychological symptoms of the disease on the family (referring to a psychologist and social worker), closing session

Results

In term of demographic variables, in experimental group, 55% and in the control 65% were women. The majority of people in both groups, aged 31 to 40 years (50% in behavioral activation group and 55% in the control group).

In term of educational level, the majority of patients had bachelor's degree (55% in behavioral activation group and 50% in the control group).

Table 2 presents the scores of DASS-21 in three stages in both groups. As seen in this table, the mean scores of depressions, anxiety, and stress were decreased in post-test and follow-up stages in the behavioral activation group significantly, while the scores of these subscale in the control group did not change in three stages.

Table 3 presents the results of the variance analysis with repeated measurements related to depression.

Table 2. The scores of DASS subscales in the pre-test, post-test, and follow-up stages

Variable	Behavioral activation group			Control group		
	Pre-test Mean ± SD	Post-test Mean ± SD	Follow-up Mean ± SD	Pre-test Mean ± SD	Post-test Mean ± SD	Follow-up Mean ± SD
Depression	14.20 ±3.41	7.30 ±2.96	7.65 ±3.18	15.40 ±3.38	13.65 ±4.18	13.25 ±4.53
Anxiety	14.95 ±3.47	8.30 ±2.47	8.30 ±2.54	14.35 ±1.06	12.90 ±4.02	12.85 ±3.62
Stress	14.35 ±3.75	9.35 ±3.80	9.95 ±3.53	15.45 ±3.27	14.35 ±4.45	13.80 ±4.40

Table 3. The results of the variance analysis with repeated measurements related to depression

Variable	Sum squares	Freedom degree	Mean square	F	P	Effect size	Test power
Level	501.72	2	250.86	63.38	0.000	0.63	1
Level*group	154.82	2	77.41	19.56	0.000	0.34	1
Group	576.41	1	576.41	17.98	0.000	0.32	0.99
Error	1218.25	38	32.06				

The results of Table 3 indicated a significant difference in the depression scores between the pre-test, post-test, and follow-up in behavioral activation group and control group (F= 63.38, *P*< 0.01). Also, the significance of the interaction between the stages with the experimental group in depression indicated that in the post-test and follow-up stages, the mean score of behavioral activation group was significantly lower than the control group (F= 19.56, *P*< 0.01). There was a significant difference between the level of depression of subjects in the behavioral activation group and the control group (F= 17.98, *P*< 0.01). These results showed the effectiveness of the family-centered behavioral activation on depression. Table 4 shows the results of the variance analysis with repeated measurements related to anxiety.

Table 4. The results of the variance analysis with repeated measurements related to anxiety

Variable	Sum squares	Freedom degree	Mean square	F	P	Effect size	Test power
Level	440.12	2	220.6	52.81	0.000	0.58	1
Level*group	178.55	2	89.28	21.43	0.000	0.36	1
Group	243.67	1	243.37	9.08	0.000	0.19	.84
Error	1019.58	38	26.83				

Based on the results of Table 4, there was a significant difference in the anxiety scores between the three stages in groups of behavioral activation and control (F= 52.81, *P*< 0.01). Also, the significance of the interaction between the stages with the experimental group in anxiety indicates that in the post-test and follow-up stages, the mean score of behavioral activation group was significantly lower than the control group (F= 21.43, *P*< 0.01). There was a significant difference between the anxiety scores of two groups (F= 9.08, *P*< 0.01). These results showed the effectiveness of the behavioral activation on anxiety. Table 5 shows the results of the variance analysis with repeated measurements related to stress in MS patients.

Table 5. The results of the variance analysis with repeated measurements related to stress

Variable	Sum squares	Freedom degree	Mean square	F	P	Effect size	Test power
Level	246.05	2	123.03	22.97	0.000	0.38	1
Level*group	80.32	2	40.16	7.50	0.000	0.16	0.94
Group	330.01	1	330.01	9.52	0.000	0.20	0.85
Error	1317.78	38					

There was a significant difference in the stress scores between the pre-test, post-test, and follow-up stages in behavioral activation group and control group (F= 22.97, *P*< 0.01). Also, the significance of the interaction between the stages with the experimental group in stress indicates that in the post-test and follow-up stages, the mean score of stress of the experimental was significantly lower than the control group (F= 7.50, *P*< 0.01). There was a significant difference between the level of stress of subjects in the two-groups (F= 9.52, *P*< 0.01). These results revealed the effectiveness of the behavioral activation on stress in MS patients.

Discussion

This study aimed to investigate the effect of family-centered behavioral activation group training on psychological symptoms in patients with multiple sclerosis. The results of this study are implicitly consistent with the findings of some other studies (18-21). However, the aforementioned studies were not identical to the present study. Our outcomes corroborate the findings of Mohr et al., who reported that cognitive-behavioral therapy, which shares some principles with behavioral activation, significantly reduced depressive symptoms in MS patients (22). Similarly, Thomas et al. found that a group-based cognitive behavioral approach effectively reduced fatigue and improved quality of life in MS patients, which is consistent with our results on psychological symptom improvement (23). The family-centered aspect of our intervention is particularly beneficial, supporting the work of Hartmann et al., who emphasized the importance of family involvement in MS patient care. Their study showed that family-focused interventions could lead to improved psychological well-being for both patients and their caregivers (24).

Moreover, the behavioral activation approach showed promise in addressing the specific needs of MS patients. This aligns with the study by Gawrysiak et al. They found behavioral activation effective in reducing depressive symptoms in a general population (25). Turner et al. studied 64 people with MS and found that behavioral activation therapy with family involvement can significantly improve the quality of life and mental health of patients with MS (26). A comprehensive meta-analysis by von Drathen et al., revealed important connections between stress and MS. The analysis found a weak to modest effect of psychological stressors on disease onset, with diagnosed stress disorders associated with a 1.87-fold increased MS risk. Notably, studies investigating military threats showed a threefold increased risk for relapses during wartime. The research also confirmed links between stressful life events and MRI activity, suggesting some effect on disease progression (27).

Bal et al. showed that behavioral activation is an effective approach for treating depression in autism patients (28). Our study extends these findings to the MS population, suggesting that behavioral activation techniques can be successfully adapted for this group. Behavioral activation therapy is based on the idea that life problems can reduce an individual's ability to experience positive rewards from their environment, leading to symptoms and behaviors that affect their lifestyle and quality of life. This therapy is structured and individualized, focusing on identifying behavioral patterns related to psychological symptoms in the early stages of group therapy (29). These patterns can vary significantly for patients with multiple sclerosis. Newly diagnosed patients often struggle more with physical symptoms, while those diagnosed for over two years may experience both physical and emotional symptoms. Patients with longer-term diagnoses may also face cognitive issues such as concentration and memory problems (18). The therapy helps patients identify these patterns and create effective activation plans. Some clients may engage in passive behaviors like excessive sleeping or substances used to reduce negative emotions, while others may be active but trapped in cycles of ruminating thoughts, deriving little pleasure from their activities (29). Behavioral activation therapy aims to change relationships with inner experiences by expanding awareness and fostering a non-judgmental, compassionate approach to experiences.

It focuses on reforming and strengthening the valuation of emotions and physical activities to reduce reactivity, fear, and unwarranted judgments. These states have increased discomfort and tension, motivating behavioral, emotional, cognitive, and experiential avoidance. The ultimate goal of this training is to experience thoughts, emotions, and sensations as they naturally occur. Various

interventions can be used to achieve this goal (20). In summary, behavioral activation therapy offers a structured yet individualized approach to addressing mental health issues, particularly for patients with conditions like multiple sclerosis.

This study faced several limitations, such as the diverse needs of patients, adapting to all patients, and coordinating with patients' families. The need for time and commitment, which was difficult for some patient's intervention duration, may have also been insufficient to observe sustained changes in mental health, as longer intervention periods might have yielded more significant results. It is recommended that future research should examine the long-term benefits of family-centered behavioral activation for patients with multiple sclerosis and identify optimal strategies for implementing this intervention in clinical settings. Finally, similar interventions could be explored in other chronic illness populations to assess the generalizability of family-centered group-based behavioral activation as a broader mental health support strategy.

Conclusion

The positive aspects of group education using the family-centered behavioral activation approach in patients with multiple sclerosis, in addition to reducing depression, anxiety, and stress in patients, can help families cope with the challenges of the disease and support their patients more effectively. It also strengthens family relationships and increases psychological support for patients.

Acknowledgments

The authors thank all participants in this study.

Conflict of Interests

The authors declare no conflict of interest.

Funding

The authors declare no financial support.

Ethical Considerations

This article is resulted from doctoral thesis of the Islamic Azad University, Kish International Branch which was approved by the Ethics Committee of Tehran North Branch, Islamic Azad University. We considered ethical considerations such as voluntary participation, confidentiality of personal information, and informed consent.

Code of Ethics

IR.IAU.TNB.REC.1402.098

Authors' Contributions

Shakila Yousefi: Designing the study, conducting the intervention, and writing a draft of a manuscript. Mahdi Nayyeri: Supervising the study process, editing the manuscript, and aiding in the revision process. Mohammad Reza Seirafi: Aiding in the research process and writing the manuscript.

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