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Evaluation of Effectiveness of Mindfulness, Logotherapy, and Schema therapy on Stress, Anxiety, and Depression in Patients with Multiple Sclerosis

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Abstract

Objective: This study aimed at evaluating the effectiveness of mindfulness-based cognitive therapy, logo therapy, and schema therapy on reducing stress, anxiety, and depression in patients with multiple sclerosis.

Methods: The present study was a quasi-experimental study with a pre-test-post-test design with a control group. The study population consisted of all members of the MS Society of Iran located in Tehran in 2019, and the sample consisted of 60 members of the Association who were selected using the convenience sampling method and were randomly assigned to three experimental groups and one control group (15 people for each group). All four groups were tested by DASS-21 scale, and then the experimental groups underwent mindfulness-based cognitive therapy, logo therapy, and schema therapy in 12 Two-hour sessions for 12 weeks, but the control group did not receive any training. Analysis was performed using SPSS22 in two parts: descriptive and inferential statistics.

Results: The results of analysis showed that mindfulness-based cognitive therapy has been effective on reducing stress (f= 110.90, P<0,001), anxiety (f= 88.92, P<0,001), and depression (f= 32.29, P<0,001) in patients with multiple sclerosis. Also it was shown that logo therapy was effective on stress (f= 264.60, P<0,001), anxiety (f= 175, P<0,001), and depression (f= 305.07, P<0,001), and schema therapy was effective on reducing stress (f=110.90, P<0,001), anxiety (f= 88.92, P<0,001), and depression (f= 32.29, P<0,001) in patients with multiple sclerosis. Also, the comparison of means showed that in the variables of stress, anxiety, and depression, mindfulness-based cognitive therapy, logo therapy, and schema therapy were effective.

Conclusions: The findings of this study confirmed that mindfulness-based cognitive therapy, logo therapy, and schema therapy were effective in reducing stress, anxiety, and depression in patients with multiple sclerosis.

Keywords: Multiple Sclerosis, Mindfulness-based therapy, Logo therapy, Schema therapy, Stress.

Introduction

The World Health Organization estimates that globally, more than 2.5 million people are affected by multiple sclerosis (MS). (Apostolopoulos,V and Matsoukas,J 2020) Multiple sclerosis is one of the most common diseases of the central nervous system that mostly occurs in the age range of 20-40. This disease has different clinical manifestations and there is no definitive laboratory diagnostic metho (Khalilnejad, A, Zahednasab, H, Khodabandeh Lou, et al., 2014).

Among the clinical manifestations of this disease, psychiatric and cognitive symptoms are more noticeable than other disabilities associated with this disease. (Cortez VR, Duriez-Sotelo E, Carrillo-Mora et al., (2012) Studies show that in 40 to 65% of patients with MS, neuropsychological changes occur (Cortez VR, Duriez-Sotelo E, Carrillo-Mora & et al.,

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(2012). It is effective in spreading the disabilities of people with this disease (Kollndorfer, K., Krajnik, J., Woitek, R., & et al., 2013). A study by (Arnett, P.A, Barwick, & et al, 2008) showed that the patient group was significantly more anxious than the healthy group. In addition, high anxiety was associated with more depression and anxiety. Research shows high levels of perceived stress is more in women with MS, which can indicate poor stress management skills in these patients. (Hajibabaei, M., Bagher Kajbaf, M; Esmaeili, M, & et.al. 2020)

Depression as one of the most common disabling and recurrence is characterized by apathy or lack of pleasure in almost everything (Barlow DH, Sauer-Zavala S, Carl JR, & et.al. 2013) which has multiple effects on various aspects of life. (Martinsen, K. D., Kendall, P. C., Stark, K., & et.al. 2016).

People with chronic diseases such as MS are more prone to symptoms of anxiety and depression than the general population. Indeed, depression is one of the most common psychiatric disorders in patients with multiple sclerosis, occurring in approximately 50 to 60% of patients with MS (Hamid, N; Mehrabizadeh H, Mahnaz Vaseghi, S, 2012; liu, X.J., Ye, H.X., Li, W.P.,& et.al. 2009).

Symptoms of depression may be due to the direct effect of inflammation and demyelination of the nerves or the result of a maladaptation reaction. (Brajkovic, L., Bras, M., Milunovic, V., & et.al. 2009) Scarborne and Nikki found that there was a significant correlation between the scores of anxiety and the variables of depression, anxiety, and practical obsession in this group of patients, but despite the importance of structural concern, few studies have examined chronic anxiety in patients with MS (Thornton,S. Tedman,S. Rigby,H.& et.al. 2006).

Studies have shown that many patients with multiple sclerosis suffer from depression (Donna JB, Cathy B, 2002) and about 25 to 40% from anxiet, y (Chwastiak, A.L., Gibbons, E.L., Ehde, M.D, & et al, 2005) which affects the quality of life of these. Patients (Janardhan, V., Bakhshi, R, 2002)

Numerous studies have shown an association between exacerbation of symptoms and the occurrence of a new attack in MS with life-threatening events (Simmons, R.D., Ponsonby, A.L., Van Der Mei, A.I, et al, 2004;Potagas, C., Mitsonis, C., Watier, L., & et.al. 2008) About 48% of patients experience symptoms of anxiety, stress, and depression within the first year after diagnosis. (Mitchell, A., Benito-Leon, J., Morales Ganzalez, M.J., & et.al. One of the innovations in psychological therapies is the combination of Eastern spiritual therapy, which is referred to as the third wave of psychotherapy, (Hayes, S.C. Luoma, J.B. Bond, F.W.& et al., 2006) and used to prevent stress and depression (Grossman P. Niemann L. Schmidt S.& et.al. 2004). Most recent studies have focused on evaluating the effectiveness of mindfulness-based therapy. Accordingly, in recent years, interventions based on mindfulness-based training have been done with a variety of health effects on some disorders such as pain relief, anxiety, and depression (Evans, R. I., Rozelle, R. M., Mittelmark, M. B., & et.al. 1978) and also with reducing rumination and depression. (Paul, N. A., Stanton S.J., Greeson J.M et.al. & 2012) A number of studies have shown the effectiveness of mindfulness-based cognitive therapy on mental well-being, anxiety and depression, pain tolerance, and mental health (Kingston, Chadwick, Meron, & Skinner, 2007; Paul, N. A., Stanton S.J., Greeson J.M., & et.al. 2012) and also reducing the temptation to use drugs (Khanna, S., Greeson, J.M, 2014).

The central concept of the schema therapy model is the early maladaptive schema (EMS). Early adaptive schemas (EAS) give rise to adaptive behaviour and emerge in childhood, when core emotional needs are adequately met by primary caregivers. (Videler AC , van Royen RJJ, Legra MJH , & et.al. 2020.)

Schema therapy developed by Young (Young, 1990). It is a new and integrated therapy that is mainly based on the development of concepts and methods of classical cognitive-behavioural therapy. This treatment provides a new system of

psychotherapy that is especially suitable for patients with chronic and refractory psychotic disorders that were previously considered a complex issue in treatment (Habibpour, Z and, Sharifi, A, 2009). Thase, Nierenberg, Vrijland,& et.al. (2010) found that schema therapy reduces the symptoms of depression and emphasizes that schema should be focused on the treatment of people with depression and anxiety. Consistent with this research, Klug and Young also showed that schema therapy has improved the symptoms of mood disorders and anxiety (Kellogg, S. H., & Young, 2006; Hawke, L.D., Provence, M.D., Parikh, S.V, 2013). Hawke & Provencher (2011) believe that schema therapy can be successfully used in the treatment of patients with anxiety disorders and beyond, personality disorders. Schema therapy can also be effective in treating chronic depression. (Malogiannis, I. A., Arntz, A., Spiropoulou, A., Tsartsara, E., A, & et.al. 2014)

People with MS feel that their lives are empty, and they immediately have doubts about the meaning of work, love, death, and life. For this reason, Logo therapy is more useful for people with chronic and progressive diseases who are facing death, have a difficult activity, are frustrated, or are in the process of coping with physical limitations (Orive, M., Barrio, I., Orive, V.M.,& et.al. 2015).

Rasooli and Borjali (2011) conducted a study entitled the effectiveness of group therapy on reducing anxiety and increasing self-confidence in patients with MS. The results of this study showed that group therapy has been effective in reducing anxiety and increasing self-confidence of patients with MS.

Recent reports from the American Academy of Neurology suggest that one of the most important exacerbations of MS is stress caused by life event (Ismaili, M and Hosseini, F, 2008; Mitsonis, C. I., Potagas, C., Zervas, I. & et.al. 2009) Anxiety and stress can be a complication of MS and also a factor in the exacerbation or recurrence of MS (Corey, 2001).

Accordingly, reviewing studies suggests that the use of various psychological methods such as cognitive-behavioural therapies, mindfulness-based cognitive therapy, schema therapy, and logo therapy can solve the problems of this disease. Due to the severity of physical and psychological problems of this group of patients with chronic diseases and the effect of psychological dimensions such as anxiety and depression on the onset or control of symptoms and human attention to a variety of low-risk and non-physical treatments, this study seeks to compare and contrast them. The effectiveness of mindfulness-based cognitive therapy, schema therapy, and logo therapy on reducing stress, anxiety, and depression in patients in experimental groups.

Method

Participants and Procedure

The present study was a quasi-experimental study with a pre-test-post-test design and a control group. The study population consisted of all members of the MS Society of Iran located in Tehran, and the sample consisted of 60 patients of the Association who were selected using the convenience sampling method and were randomly assigned into three experimental groups and one control groups (15 people for each group). Inclusion criteria included age between 20 and 50 years, minimum level of high school education, ability to attend training sessions, and lack of acute psychological disorders or chronic diseases. Exclusion criteria were simultaneous participation in other counselling therapy, absence of two or more training sessions, and unwillingness to participate in sessions. All four groups were tested in the first measurement by performing a pre-test using DASS-21scale, and then the experimental groups were trained in 12 Two-hour sessions for 12 weeks. But the control group did not receive any training. After the therapeutic intervention, all four groups

were post-tested with the above scale. The collected data were analysed using multivariate analysis of variance (MANOVA) with SPSS - 22 software.

Ethical statements

The participants were informed about the purpose of the research and its implementation stages. After receiving the consent and emphasizing the confidentiality of the participants' personal information, they were assured that they could leave the treatment at every stage they wished, and the results of the research would be available to them.

Research tool

Questionnaire (DASS-21): a standardized questionnaire was used to measure the subjects' stress, anxiety, and depression. This scale has two different forms. Its original form has 42 questions through which each of the psychological structures (depression, anxiety, and stress) are evaluated by 14 different items. But its abbreviated form contains 21 questions, each of which measures a psychological factor or structure (Lovibond SH, Lovibond PF, 1995).

In Iran, the reliability of this tool has been reported in a sample of the general population of Mashhad (400 people) for the rate of depression 7.0, anxiety 66.0, and stress 76.0 Sahebi, A. Asghari, M. Salari, R, 2005. Validity and reliability of this tool has been tested and approved by Rezaei Adriani, M. Azadi A. Ahmadi, F, et.al. 2007.

The statistical method of multivariate analysis of variance was used to examine the difference of group scores. All statistical analysis in this study was performed using SPSS 22 statistical software.

Findings

The variables in the present study were measured in two stages. The first measurement for all indicators was a pre-test that was performed before the intervention and the second measurement was a post-test, which was performed after the intervention.

Table 1: Mean and standard deviation of stress, anxiety, depression groups

Comparison		Mindfulness		Schema therapy		logo therapy		Control		Comparison	
Variable	Test	SD	M	SD	M	SD	M	SD	M	F	Sig
Stress	pre- test	1/06	15/46	1/95	16/13	1/90	17/06	1/54	16/40	2/39	0/07
	Post-test	1/06	9/53	1/83	13/23	1/17	12/66	1/37	16/20	55/75	0/001
Anxiety	pre- test	1/74	14/80	1/70	14/93	1/75	14/73	1/84	14/40	0/24	0/86
	Post-test	0/99	9/13	1/35	12/13	1/12	10/53	1/76	13/86	37/69	0/001
Depression	pre- test	1/66	15/06	1/82	15/20	1/51	16	1/59	15/13	1/04	0/37
	Post-test	0/91	8/46	1/18	12/86	0/75	11	1/84	14/60	71/53	0/001

Multivariate analysis of covariance was used to investigate the role of cognitive therapy based on mindfulness, Logo therapy, and schema therapy on stress, anxiety, and depression. One of the assumptions of this test was to examine the homogeneity of variance-covariance matrices that the box test was used.

The results showed that the variance of matrix-covariance's are not homogeneous (P <0.022, 8622/129/584 = 1.584, 30F, Boxes M = 54.69). Then, Levine's test was used to examine the assumption

of the equality of variances of stress, anxiety, and depression variables, the results of which show that the assumption of variance homogeneity in anxiety variables (F = 1/274, P = 0/292) is established, but for dimensions of stress (F = 4/14, P = 0/010) and depression (F = 6/960, P = 0/001) were not met. In order to investigate the linearity of the relationship in this study, pre-test variables of anxiety, stress, and depression were considered as covariate variables and post-test as dependent variables.

P = 0.001) was significant at the level p<0.05, so the data did not meet the assumption of regression homogeneity. Therefore, analysis of variance was used to compare groups for different scores.

Multivariate tests were used to evaluate the differences between the studied dimensions in the four groups.

The presented findings show that there is a significant difference in the scores (pre-test- post-test) between the four groups. Then, in order to investigate the

Table 2: Mean and standard deviation of difference scores for variables of stress, anxiety, depression

Variable	Mindfulness		Schema therapy		logo therapy		Control	
	SD	M	SD	M	SD	M	SD	M
Stress	0/59	-5/93	0/77	-2/80	0/82	-4/40	0/56	-0/20
Anxiety	0/89	-5/66	0/77	-2/80	0/94	-4/20	0/51	-0/53
Depression	0/98	-6/60	1/11	-2/33	0/84	-5	0/51	-0/53

Table3: Multivariate test results in indicators of stress, anxiety, depression

Test	**Value**		**Df**	**The significance** level
Pilay effect	1/637	16/52	12	0/001
Wilks ambda	0/010	54/27	12	0/001
Hotling ffect	35/351	152/20	12	0/001
The biggest root on	33/614	462/19	12	0/001

According to the obtained correlation, the assumption of linearity between confluent and dependent variables for the variables of stress (r = 0.579), anxiety (r = 0.475), and depression (r = 0.365) was realized (the criterion is noteworthy), because the reasonable correlation is below 0.7.

The results of the regression homogeneity hypothesis showed that F calculated for group interaction and pre-test for stress (F = 45.80, P = 0.001), anxiety (F = 50.71, P = 0.001), and depression (F = 87.45,

role of mindfulness-based cognitive therapy, Logo therapy, and schema therapy on the indicators of stress, anxiety, and depression in patients with MS, analysis of variance was used, the results of which are shown in table 4

The results of Table 4 show that there is a significant difference between the three experimental groups and the control group in the variables of stress, anxiety, and depression. Accordingly, Bonferroni post hoc test was used to investigate the differences

between the groups and compare the means one by one, the results of which are presented in Table 5

anxiety, and depression.

Comparison of experimental groups also showed

Table 4: Results of variance analysis of scores for research variables

The dependent variable	Total squares	Df	Average squared	F	The significance level	η^2
Stress	270/00	3	90/00	160/85	0/001	0/896
Anxiety	214/73	3	71/57	74/41	0/001	0/799
Depression	329/51	3	109/83	92/26	0/001	0/832

Table 5: Paired comparison of interventions in the post-test stage based on the variables of stress, anxiety, and depression

The dependent variable	Group	Comparison group	difference in averages	The significance level 0/001
Stress	Control	logo therapy	4/20	0/001
	Control	Mindfulness	5/73	0/001
	Control	Schema therapy	2/60	0/001
	logo therapy	Mindfulness	1/53	0/001
	logo therapy	Schema therapy	-1/60	0/001
	Mindfulness	Schema therapy	-3/13	0/001
Anxiety	Control	logo therapy	3/66	0/001
	Control	Mindfulness	5/13	0/001
	Control	Schema therapy	2/62	0/001
	logo therapy	Mindfulness	1/46	0/001
	logo therapy	Schema therapy	-1/40	0/001
	Mindfulness	Schema therapy	-2/86	0/001
Depression	Control	logo therapy	4/46	0/001
	Control	Mindfulness	6/06	0/001
	Control	Schema therapy	1/80	0/001
	logo therapy	Mindfulness	1/60	0/001
	logo therapy	Schema therapy	-2/66	0/001
	Mindfulness	Schema therapy	-4/26	0/001

The results of Table 5 showed that there is a significant difference between the control group and the experimental groups in all variables of stress,

a significant difference in the mean of research variables. Therefore, the research hypothesis stating that there is a difference between the effectiveness

of mindfulness-based cognitive therapy, logo therapy, and schema therapy on the dimensions of stress, anxiety, and depression is confirmed. The effectiveness order of the treatments is 1- mindfulness-based cognitive-behavioural therapy, 2- logo therapy, and 3- schema therapy.

Discussion and Conclusion

This study aimed to examine the effectiveness of mindfulness-based cognitive therapy, logo therapy, and schema therapy in reducing stress, anxiety, and depression in patients with multiple sclerosis. The results of variance analysis of scores showed that mindfulness-based cognitive-behavioural therapy has been effective on reducing stress (f= 110.90, P<0,001), anxiety (f= 88.92, P<0,001), and depression (f= 32.29, P<0,001) in patients with multiple sclerosis. The results of this study are consistent with the results of some studies (Soysa, C.K., Wilcomb, C.J, 2015; Kazemi, H., Shojaei, F .,Mohammad Soltanizadeh, M, 2017; Bakhshipour, B and Ramezanzadeh, S, 2016; Mohammadi, N., Takreli, F., Khodavisi, M & et.al. 2017).

In explaining this finding, it can be said that mindfulness-based cognitive therapy in patients with MS has led to a reduction in emotional response and emotional regulation. Using mindfulness exercises, patients seem to be able to reduce automatic and habitual responses to stressful and distressing experiences. Using a list of irrational thoughts and desires may also, help them identify their thoughts that cause anxiety and stress more consciously. Recognizing and challenging such irrational thoughts leads to a more logical and realistic learning of these thoughts, which in turn reduces anxiety, stress, and depression disorders (Eyles, C., Leydon, G.M., Hoffman, C.J.&et al, 2015; Soysa, C.K., Wilcomb, C.J, 2015).

During the treatment sessions, patients understand that the living conditions of every human being are not perfect and the person is not alone in his sufferings, deficits, and shortcomings, and he is not the only one who suffers from such problems. (EzzatPanah,f.latifi,Z., 2020)

By focusing mindfulness training on intra-personal processes, this training may help patients to change their relationships with their inner states, thoughts, and feelings, thereby reducing the internal symptoms of anxiety. Also, training in muscle relaxation techniques, deep concentration, and muscle relaxation along with mental relaxation normalizes the flow of breathing and reduces external symptoms of anxiety (palpitations, nausea, hypotension, sweating, and difficulty breathing) in participants of this study.

Also, preparing a list of daily negative thoughts and replacing them with positive thoughts may have helped them to change the negative thoughts and reduce their destructive effect in these patients (Soysa, C.K., Wilcomb, C.J, 2015). It seems that mindfulness training led to the strengthening of the elements of attitude, attention, and the intent in patients.

The results showed that logo therapy was effective in reducing stress, anxiety, and depression in patients with multiple sclerosis. According to the results of the present study, logo therapy can promote spiritual capability and expand understanding of the realities of life in patients with multiple sclerosis. The results of variance analysis of scores showed that logo therapy has been effective in reducing stress (f= 264.60, P<0,001), anxiety (f= 175, P<0,001), and depression (f= 305.07, P<0,001) in patients with multiple sclerosis. The results of the present study are consistent with the results of some other studies; (Morgan, 2013 ; Angelina, M. J., & Rosalito, D. G, 2013; Kyung, A. K., Kim, S. J., Song, M. K.&, et.al. 2013; Kleftaras, G., Psarra, E, 2012 ; kang, 2010; Kang K, Jea IM, Kim IM, & et.al. 2009;. Ghorban Alipour, M; Moghaddamzadeh, A and Jafari, I, 2017)

Evidence indicates that logo therapy has had positive results in stressful or perceived hopeless situations, which can have adverse effects on mental health (Mason, 2014; Schulenberg, S. E., Hutzell, R.

R., Nassif, C.,et al, 2008).

Mortell (2020) Contend that there are few situations in which logo therapy cannot be used to assist patients in psychological distress. This situation is contraindicated with patients experiencing psychosis. However, logo therapy can help patients and family members better accept and cope with an ongoing psychotic diagnosis

The results of the present study showed that schema therapy has been effective on stress, anxiety, and depression in patients with multiple sclerosis. The results of analysis of variance of scores showed that schema therapy has been effective on reducing stress (f=110.90, P<0,001), anxiety (f= 88.92, P<0,001), and depression (f= 32.29, P<0,001) in patients with multiple sclerosis. This result is consistent with the results of studies by (Nenadić, L., Lamberth, S., Reiss, N., 2017; Dickhaut, V. & Arntz, A., 2014; Malogiannis, I. A., Arntz, A., Spiropoulou, A., Tsartsara, E., A et al, 2014; Hazlett-S.H., 2012; Ghorban Alipour, M., Moghaddamzadeh, A and Jafari, I., 2017; Tusi Rad, S. R .Razavi Nematollahi, V. S., 2016 ; Ahmadi, M.Karaminia, R., 2011).

According to the principles of this technique, irrational beliefs are rooted in maladaptive schemas. (Nenadić, L., Lamberth, S., Reiss, N, 2017; Hazlett-S.H, 2012) the schematic therapy, by improving the early maladaptive schemas, can modify their misconceptions and beliefs. (Oraki, 2019)

Activation of these schemas, which have cognitive, emotional, and behavioural components, releases levels of emotion that directly or indirectly lead to psychological disorders. (Thase Me, Nierenberg Aa, Vrijland P, &et al., 2010)

Mental disorders and dysfunctional cognitions are characters of stress disorders, anxiety, and depression. Since the emphasis of schema therapy techniques is on emotions, it seems that these techniques have been able to help reduce stress, anxiety, and depression by informing and achieving emotion acceptance by the individual. In fact, the use of schema therapy techniques helped patients with multiple sclerosis to reorganize emotionally, explore new self-learning, regulate interpersonal emotion, and self-relax to provide the basis for improving affected schemas. (Titov N, Dear BF, Ali S, et al., 2015)

According to Yang, schema therapy helps satisfy the patient's unsatisfied emotions. When these emotional needs are partially satisfied during the treatment process, they provide the basis for improving schemas because maladaptive schemas are primarily created due to unsatisfied emotional needs (Thase Me, Nierenberg Aa, Vrijland P, &et al, 2010).

The lives of patients treated by schema provide the basis for emotional insights and subsequent improvement of their schemas. It also seems that by using the mental imaging technique in this study, patients were able to succeed in recognizing the main schemas, understanding its evolutionary roots, and relating these roots to their current lives. In addition, the use of this technique improved patients' perceptions and helped them move from rational cognition to emotional experience. (Nenadić, L., Lamberth, S., Reiss, N., 2017; Malogiannis, I. A., Arntz, A., Spiropoulou, A., Tsartsara, E., A, & et.al. 2014)

In the present study, by providing the possibility of the occurrence of major emotions such as anger, imaginative dialogue technique prepared the ground for emotional discharge of patients and caused distance from harmful schemas. Mental imagery for modelling also distanced itself from extreme coping styles of avoidance and compensation, and on the other hand, using the technique of letter writing, patients had the opportunity to express their rights and their feelings. As the re-creation of early maladaptive schemas and maladaptive coping styles exacerbates these people's problems and ultimately puts their mental health at risk that manifests itself as a symptom of stress, anxiety, and depression, schema therapy can be useful for them. In the schema therapy, people, through various techniques and

by challenging schemas (affirmative and negative evidence), realize that they have false schemas and should not look at them as absolute facts, but should consider them as hypotheses that should be tested. (Karami J, Aazami Y, Jalalvand M, &et al., 2016)

Although medication is the mainstay of treatment for patients with multiple sclerosis, research in recent years has shown that adding psychological interventions to the treatment plan can increase the effectiveness of the medication. Despite the limitations, it seems that the above therapies can be used as a complementary method along with the pharmacological method to control and improve mental and physical disorders because of its benefits. The results of this study showed a significant difference between the effectiveness of cognitive- mindfulness-based cognitive behavioral therapy, logo therapy, and schema therapy on the dimensions of stress, anxiety, and depression. The levels of effectiveness degree were 1- Cognitive therapy based on mindfulness, 2- logo therapy, and 3- Schema therapy, respectively. The results of this study confirm the effectiveness of mindfulness-based cognitive therapy, logo therapy, and schema therapy in reducing stress, anxiety, and depression in patients with multiple sclerosis.

Limitations

One of the limitations of this study was that all participants in the four study groups were female; it is justified as women are three times more vulnerable to multiple sclerosis than men. However, it is recommended that the male population also be used for future studies. It is also recommended that future researchers use subjects who have not received any other psychological treatments. For more generalizability of the results, it is better to use random samples instead of available samples.

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