

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

5,200

Open access books available

129,000

International authors and editors

150M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Non-Pharmacologic Therapies

*Seyyedeh Zahra Safi*

## Abstract

The aim of this chapter is to assess the effectiveness of non-pharmacologic therapies like progressive muscle relaxation therapy (PMRT) as an adjunctive therapy for reducing level of depression for multiple sclerosis (MS) patients. One of the most common mood disorders is major depressive disorder (MDD) that MS patients experience it during their lives. MDD can exacerbate the symptoms of the MS disease. Non-pharmacologic therapies were held for the MS patients, twelve sessions of PMRT using Bernstein and Borkovec's method in spring 2010. According to the results, PMRT is effective in reducing depression. This therapy enables patients to reach relaxation quickly and thus can cope with depression reactions effectively.

**Keywords:** non-pharmacologic therapies, multiple sclerosis, depression, progressive muscle relaxation therapy

## 1. Introduction

These days the goal of all current and emerging therapeutic strategies for multiple sclerosis (MS) patients is to return them to a normal life despite of the disease [1].

Currently there is not any definitive treatment for MS disease and medications only reduce relapse rate, prolong remission, limit the onset of new MS lesions, and postpone the development of long-term disability [2].

Pharmacologic therapies (modafinil, dalfampridine, baclofen, diazepam, gabapentin, opioids) are used for symptomatic treatment of disability and symptoms, but these do not improve disease outcome [2].

The cause and cure is unknown; appearing, removing and even relapsing of symptoms occurs without any signs warning [3] and the onset of the disease may be acute or gradual [1]. Strong evidence for irreversible neurological disability in MS patients indicates that MS disease is an autoimmune disease against central nervous system myelin or neuron degeneration [4].

MS disease may prevent from some patients activities such as; employment, relationships (social, familial), goals and long term plans and activities of daily living [3]. Therefore these disabilities will challenge persons with MS disease, when they are attempting to pursue an active and compatible lifestyle [5].

Variable courses in MS disease are common. Within two to three decades, this disease changes from recoverable to unrecoverable neurological disorder and stable disability [6].

One million people in the world suffer from MS disease that has been reported 1.8 times more in females than males. MS is co morbid with psychiatric disorders and has a profound effect on the personal lives of individuals [7, 8].

The psychosocial factors are closely associated with MS onset and may play important roles in the development of the disease [9].

MS disease usually indicates disparate disease periods and interaction between medical and psychological variables in MS disease is complex [7].

People with multiple sclerosis (MS) often report depression, poor sleep, fatigue, sleepiness and cognitive dysfunction. Interrelationships between symptoms are poorly understood [10].

For example findings suggest that treatment for depression is associated with reductions in the severity of fatigue symptoms [11] and many patients with multiple sclerosis (MS) report that stress can exacerbate disease [12].

Cognitive impairment is common in this disease [13]. Prevalence of cognitive impairment is about 30.5% and affects attention, concentration, performance, processing speed and visual perception [14].

These data point out the importance of orienting therapeutic interventions. For managing the symptoms of MS disease and improving or maintaining function and preserving the patient's quality of life are recommended careful clinical monitoring and pharmacologic and non-pharmacologic therapies [15].

Non-pharmacologic therapeutic strategies include psychotherapy, cognitive behavioral therapy, strengthen of coping, progressive muscle relaxation therapy (PMRT), etc. [16].

Non-pharmacologic therapies are used widely by MS patients and progressive muscle relaxation therapy (PMRT) is a form of complementary therapies [17].

For the first time Jacobson in 1934 recognized that the mind and selected muscles (16 muscle groups) work together in a united way. It means body can be relaxed with mental relaxation and mind can be relaxed with progressive muscle relaxation therapy (PMRT) [18].

This procedure was suited by Wolpe (1948) for systematic desensitization therapy and by Bernstein and Borkovec for stress management in cognitive-behavioral therapy in 1973. The Bernstein and Borkovec forms are brief and adapted that these are used generally (7 or 4 muscles groups) [18, 19].

In fact, relaxation therapy is several methods to show patients how they can achieve relaxation. Most programs include training special breathing and progressive muscle relaxation (tension-release cycles) to reduce physical and mental tension [20].

The relaxation response is a physiological state and incompatible response against stress response [21] and has a significant psychological impact on specific aspects of our personality and changing unwanted habits and attitudes [22].

Muscle tension is associated with stress and anxiety, which are related with depression strongly [20]. Depression had a negative impact on all quality of life domains and anxiety impact on mental domains [23].

It seems that unpredictable courses of disease activity influence in many different fields of their life. Unpredictable periods can make severe feelings of helplessness and depression in patients with MS [7], also the hopelessness hypothesis states that unpredictable and negative events of life patients leads to depression [24].

Depression is the predominant psychological disturbance with lifetime prevalence around 50% and annual prevalence of 20%. With diagnosis of MS, anxiety increases and depression is commoner during relapses also increases the rate of suicidal ideation and treating depression improves adherence to disease-modifying drugs [25].

MS patients often hide symptoms of depression and they complain from other symptoms [26]. Therefore treatment plans for depression among MS patients should be treated with individual and integrated approach [25].

According to the American Psychological Association (2018), people with depression may experience a lack of interest and pleasure in daily activities, inability to concentrate, feelings of worthlessness or excessive guilt and recurrent

thoughts of death or suicide (non-somatic symptoms), significant weight loss or gain, insomnia or excessive sleeping, lack of energy (somatic symptoms).

Significant results show that PMRT, helpfulness for human suffering from depression in groups with brain health (different patients, like: multiple somatoform syndrome, cancer disease, pulmonary disease, cardiac disease, muscular pain, tinnitus disease and night eating syndrome) and brain lesion (MS patients).

Treatment by PMRT for depression is better than no-treatment or placebo treatment or other behavioral methods treatment. The comparison between the first intervention and the follow up showed that the effect of the treatment remained (sometimes more) [27–39].

According to recent researches, it was assumed that PMRT may reduce the level of major depressive disorder in female MS patients in Shiraz Multiple Sclerosis Aid Society (SH.M.S.A.S).

## **2. Methods and materials**

This study was an applied-experimental research with randomized controlled trial design plus pre and posttests.

Study included the independent variable (progressive muscle relaxation therapy PMRT) and dependent variable (depression).

This study compared two groups; experimental and control.

The first group received (PMRT) and the second group did not receive any treatment for depression.

In spring 2010, from 2800 MS patients in SH.M.S.A.S 30 female volunteers participated in this study.

They answered the questionnaire before the intervention (Beck Depression Inventory BDI-II).

Criteria of MS and major depressive disorder (MDD) disease from minimal to severe were confirmed by the SHMSAS and BDI-II.

After the pretest, cases were matched in terms such as: degree of depression age, marital status, education and income then randomly divided in two groups.

The experimental group received standard care for MS disease plus 60 min of psychological intervention (PMRT) for each session (twice a week for six weeks) by M.A Clinical Psychology in Society of MS.

The control group received only standard care for MS disease.

Until the end of the treatment, drop out did not occur in the number of patients and two groups cooperated again in the posttest (answered the questionnaire for the second time).

### **2.1 Rights and criteria**

Ethical considerations and rights were applied for this research (respect to basic rights of patients such as; privacy, cultural and social values, freedom of choice and honesty about characteristics of therapy and therapist's competence).

Selection criteria:

1. Willing to attend in therapy meeting.
2. Having physical ability and minimal level of literacy was sufficient.
3. Accepting the philosophy of doing daily assignments and filling out weekly notes.

## **2.2 The content of therapy sessions**

The best way for muscle relaxation is for muscles to be contracted as much as possible, and then be relaxed suddenly (tension-release sequence). The released force from the treatment increases the excitability threshold. The released force is a big step toward deeper relaxation and patients can understand the feeling of tension and relaxation of muscles (comparative judgment). Relaxation therapy was divided to two parts:

1. The first six sessions: special breathing plus contraction and relaxation of muscles, with gradual reduction of the number of muscles involved.
2. The second six sessions: special breathing plus contraction and relaxation of mind [21].

## **2.3 Tools**

In this intervention for therapy meetings, Progressive Muscle Relaxation, was used by method of Bernstein and Borkovec, 1973 [18], also the Beck Depression Questionnaire (Beck, Epstein, Brown and Steer, 1988) was used, with the reliability (0.91) and validity (0.87) of the Iranian valid [40].

The BDI-II was expanded based on criteria of diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV) for diagnosing depressive disorders [41].

The BDI-II is a brief scale that it is suitable for researchers as a screening tool. It is a subjective paper and pencil questionnaire with ordinal scale. In addition cut-off points (0–13), (14–19), (20–28) and (29–63) show minimal, mild, moderate and severe depression [41].

## **2.4 Iranian validation**

Based on Iranian Validation, validity was certified by positive correlation, between Beck Depression Inventory (BDI-II) and Brief Symptom Inventory (BSI), coefficient of Pearson was 0.87, and factor analysis showed physical factor, cognitive factor and affective factor.

And reliability was certified by method of internal consistency, Cronbach's alpha coefficient was 0.91 [40].

## **2.5 Analysis method of data**

To remove covariate variable was applied Analysis of Covariance and to remove difference between two groups was applied Levine Test.

In this intervention, the variables were Progressive Muscle Relaxation Therapy as independent and Depression as dependent variable after that analysis of Variance was applied with technique of Repeated Measures.

## **3. Results**

Thirty MS patients attended in this intervention that they were separated randomly in two groups (experimental and control). **Tables 1** and **2** was designed for context variables and descriptive statistics of depression.

**Table 1**, shows half of patients in this intervention were sick more than 5 years and they had tolerated symptoms from mild to severe and they were in the third decade of their life and in status of marital single patients were more than others. Also in education degree most of them had a bachelor's degree.

All patients had depression and some of them had severe depression that in experimental group the mean value indicates mild depression (the results are revealed in **Table 2**).

The intervention hypothesis explains that PMRT may reduce the level of depressive disorder. This assumption was checked by **Tables 3–5**.

**Table 3**, was designed to measure the equality of variances between groups.

The results indicate that there was no significant difference in the variance of groups.

The purpose of Covariance Analysis in **Table 4** was to eliminate of the covariate variable from the dependent variable and to estimate the central indexes.

After intervention, with notice to the significance level and after omitting the impact of pretest on posttest, finding revealed the mean and standard deviation has increased (reduce depression). A significant reduction in depression variable occurred in seven levels.

In **Table 5**, Analysis of Variance with Repeated Measures method reviewed the impact of intervention on depression.

**Table 5** showed that the difference between pretest and posttest was significant ( $p = 0.0001$ ) and this difference was 49% reduction in depression levels, it means that this reduction has occurred because of the relaxation therapy and statistical power was 99%.

		Experimental group		Control group	
		Frequency	Percentage	Frequency	Percentage
Sick precedent	Less than 2 years	4	0.26	4	0.26
	2–5 years	2	0.13	3	0.20
	5–10 years	7	0.46	8	0.53
	More than 10 years	2	0.13	0	0.00
Age	Second decade	5	0.33	4	0.26
	Third decade	5	0.33	6	0.40
	Fourth decade	4	0.26	3	0.20
	Fifth decade	1	0.06	2	0.13
Marital status	Single	7	0.46	5	0.33
	Married	5	0.33	6	0.40
	Divorced	2	0.13	2	0.13
	Widow	1	0.06	2	0.13
Education degree	High school	3	0.20	4	0.26
	Diploma	4	0.26	5	0.33
	Bachelor	8	0.53	6	0.40
	Master	0	0.00	0	0.00

**Table 1.**  
 Context variable in experimental and control groups.

	Control		Experimental		Total	
	After	Before	After	Before	After	Before
Mean	15.93	15.86	8.40	16.20	12.16	16.03
Median	13	13	5	16	10	14
Mode	10	11	5	11	5	11
Sum	239	238	126	243	365	481
Std. deviation	9.72	9.76	9.43	9.50	10.16	9.46
Variance	94.49	95.26	88.9	90.31	103.24	89.62
Range	31	31	40	36	40	37
Maximum	34	34	40	40	40	40

**Table 2.**  
*Descriptive statistics of depression variable.*

	F	First-degree of freedom	Second-degree of freedom	Significant level
Depression	0.463	1	28	0.502

**Table 3.**  
*Levine test results (about equal variances in the two groups).*

Experimental group	Average	Standard deviation	Number	Average difference	Meaningful level
Before intervention	16.08	1.03	15	7.83	0.000
After intervention	8.24	1.03	15	-7.83	0.000

**Table 4.**  
*The estimate of average depression variable.*

	Source of changes	Sig	Effect	Statistical power
Effects	Depression	0.0001	0.49	99
	Interaction depression and group	0.0001	0.55	99
	Error			

**Table 5.**  
*Results of variance analysis with repeated measures method.*

## 4. Discussion

MS patients spent a lot of time to control emotional disorders, like depression. Levels of depression were studied by researchers and the results showed high levels of this variable and the effects of depression on MS disease exacerbation [42–59].

For example:

The possibility that the health status of negative mental can change period of MS disease since Charcot (1879, he was the first proposer), has been discussed, that shows grief and worry might influence on onset and exacerbation of disease symptoms [3].

Negative emotions (like depression) in the MS patients correlated with their family troubles and social isolation [9].

Non-somatic symptoms of depression can predict cognitive performance [14] and on the other hand somatic and non-somatic symptoms of depression predict exacerbation of MS disease [60].

Depression is an important predictor parameter on psychological balance of MS patients [61] and studies have confirmed that there are the relationships between structural brain lesions with depression in MS patients [24] and may be lesion site has two function: increases in depression and sleep disturbance (fatigue symptoms) [62].

Previous studies have indicated that depression is prevalent in MS patients and affects treatment adherence and associates with the neurologic damage that results from multiple sclerosis [42–59].

This study was designed to purpose that with identifying and treating the first symptoms of depression, patients can increase the performance of themselves in the society.

This study was designed to assess hypothesis derived from the Gate Theory this theory states that psychological factors influence on physical factors of pain [physical pain and psychological pain]. It means, the same way that stress and discomfort can exacerbate pain, relief and relaxation can also reduce pain [63] and depression is an overwhelming psychological pain [64], therefore this randomized controlled study during twelve sessions was carried out to determine the effects of treatment on experimental group. The results showed that there was a significant relationship between treatment and depression. **Table 4** shows mild depression in experimental group and after intervention average of depression reduction was seven levels; operationally it define that patients in experimental group indicated state of depression like normal people.

Analysis of Variance showed that these changes (it was 49%) in the group, were as a result of progressive muscle relaxation therapy.

**Table 2** shows severe depression in some cases before and after treatment. They often hide symptoms of depression or cannot recognize between symptoms of depression and MS disease. Also previous treatments (like pharmacologic therapy) for severe depression were continued. These cases took less advantage from this treatment.

Measurement of depression in patients with MS is complicated because some of the symptoms are identical between depression and MS disease (excessive fatigue, cognitive difficulties, psychomotor retardation, mood changes, sleep changes and emotional changes) [65].

Findings of this study showed that the level of depression (first symptoms of depression), even in the short-term treatment has reduced, which were considered 6 weeks (as a safe, inexpensive and effective intervention) and demonstrated the effectiveness of PMRT in reducing depression as non-pharmacologic treatment, when treatment was used systematically.

Findings of this short-term treatment were consistent with the research of Jorm and Morgan [20]. They confirmed that PMRT as psychological intervention for depression patients are more acceptable than other interventions (relaxation imagery, autogenic training) and finding of Annette and Jens's study [66] demonstrated both cognitive behavioral therapy (CBT) and PMRT appear to be effective treatments for depression in the normal human brain.

Based on the results of Sutherland and Andersen [3] and Artemiadis and Vervainioti [39] and Molina and Pérez in Spain [67] and Ghafari and Ahmadi in Iran [68], potentially, it could be stated that PMRT may provide benefits in different dimensions of the disease (vitality, fatigue, depression) in the brain affected with MS.

However in psychological interventions, therapist training is essential. In fact, relaxation technique is an acceptable psychological intervention, which this method requires less skill and training than other techniques.

Finally, rationale and supporting evidence, and techniques used in Progressive Muscle Relaxation Therapy was summarized in this article for intuitive understanding of future researchers about influences of PMRT.

#### **4.1 Suggestions**

PMRT is effective treatment for depression in MS patients, although more studies should be done for investigating the relaxation therapy as a first-line treatment in a stepped care approach to managing depression in MS patients. Therefore, to obtain more accurate results, the following recommendations are given:

1. It is suggested that in future studies, should be used more objective clinical and laboratory studies.
2. More control of confounding variables can reduce the limitations of the study (such as: sex, social and cultural status and disease progression).
3. Quantity of therapy will be better by using tapes, movies or booklets and long-term treatment.
4. Finally, it is recommended screening programs for depression in MS disease for facilitating access to services for all MS patients.

#### **Acknowledgements**

All praise belongs to Allah (Alhamdulillah) for giving me an opportunity to complete this study. Allah bless and special greetings upon prophet, Mohammad (peace be upon him) and his household who has saved humanity from the darkness to the lightness.

This study dedicated to Hazrat Fateme-Zahra (peace be upon her), Imam Hosein (peace be upon him) chief of martyrs and Imam Mahdi (peace be upon him). Also this study dedicated to martyrs of the 8 years of the holy defense (martyr Seyyed Ahmad Safi, martyr Mohammad-Jafar Pourakbari, martyr Seyyed Mohammad Safi).

IntechOpen

### **Author details**

Seyyedeh Zahra Safi<sup>1,2</sup>

1 Psychology and Counseling Organization of Islamic Republic of Iran, Shiraz,  
Islamic Republic of Iran

2 M.A Clinical Psychology, Member of Psychology and Counseling organization of  
Islamic Republic of Iran, Iran

\*Address all correspondence to: [safi5zohreh@gmail.com](mailto:safi5zohreh@gmail.com)

### **IntechOpen**

© 2019 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] McCabe MP, McKern S. Quality of life and multiple sclerosis: Comparison between people with multiple sclerosis and people from the general population. *Clinical Psychology in Medical Settings*. 2002;**9**(4):287
- [2] Tullman MJ. A review of current and emerging therapeutic strategies in multiple sclerosis. *Managed Care*. 2013;**19**(2):21-27
- [3] Sutherland G, Andersen MB, Morris T. Relaxation and health-related quality of life in multiple sclerosis: The example of autogenic training. *Behavioral Medicine*. 2005;**28**(3):249-256
- [4] Keegan BM, Noseworthy JH. Multiple sclerosis. *Annual Review of Medicine*. 2002;**53**:285-302
- [5] White LJ, Dressendorfer RH. Exercise and multiple sclerosis. *Sports Medicine*. 2004;**34**(15):1077-1100
- [6] Trapp BD, Nave KA. Multiple sclerosis: An immune or neurodegenerative disorder. *Annual Review of Neuroscience*. 2008;**31**:247-269
- [7] Shnek ZM, Foley FW, LaRocca NG. Helplessness, self-efficacy, cognitive distortions and depression in multiple sclerosis and spinal cord injury. *Annals of Behavioral Medicine*. 1997;**19**(3):287-294
- [8] Skokou M, Soubasi E, Gourzis P. Depression in multiple sclerosis: A review of assessment and treatment approaches in adult and pediatric populations. *ISRN Neurology*. 2012;**2012**:1-6
- [9] Liu XJ, Ye HX, Li WP. Relationship between psychosocial factors and onset of multiple sclerosis. *European Neurology*. 2009;**62**(3):130-136
- [10] Sater RA, Gudesblatt M, Kresa-Reahl K, Brandes DW, Sater PA. The relationship between objective parameters of sleep and measures of fatigue, depression, and cognition in multiple sclerosis. *Multiple Sclerosis Journal Experimental, Translational and Clinical*. 2015;**1**:1-8
- [11] Mohr DC, Hart SL, Goldberg A. Effects of treatment for depression on fatigue in multiple sclerosis. *Psychosomatic Medicine*. 2003;**65**(4):542-547
- [12] Mohr DC, Goodkin DE, Nelson S. Moderating effects of coping on the relationship between stress and the development of new brain lesions in multiple sclerosis. *More Psychosomatic Medicine*. 2002;**64**(5):803-809
- [13] Hardmeier M, Schoonheim MM, Geurts JJ, Hillebrand A, Polman CH, Barkhof F, et al. Cognitive dysfunction in early multiple sclerosis: Altered centrality derived from resting-state functional connectivity using magneto-encephalography. *PLoS ONE*. 2012;**7**(7):420
- [14] Sundgren M, Maurex L, Wahlin A, Piehl F, Brismar T. Cognitive impairment has a strong relation to non-somatic symptoms of depression in relapsing-remitting multiple sclerosis. *Archives of Clinical Neuropsychology*. 2013;**28**(2):144-155
- [15] Crayton HJ, Rossman HS. Managing the symptoms of multiple sclerosis: A multimodal approach. *Clinical Therapeutics*. 2006;**28**(4):445-460
- [16] José Sá M. Psychological aspects of multiple sclerosis. *Clinical Neurology and Neurosurgery*. 2008;**110**(9):868-877
- [17] Ghafari S, Ahmadi F, Nabavi M, Kazemnejad A, Memarian R, Rafatbakhsh M. Effectiveness of applying progressive muscle relaxation technique on quality of life of patients

with multiple sclerosis. *Clinical Nursing*. 2009;**18**(15):2171-2179

[18] Bernstein D, Borkovec T, Carlson K. In: Sahebi A, editor. *Progressive Relaxation Training: A Manual for the Helping Professions*. Mashhad: Ferdowsi University Press; 1992. Translated by Sahebi A (Persian)

[19] McCallie MS, Blum CM, Hood CJ. *Progressive muscle relaxation*. *Human Behavior in the Social Environment*. 2006;**13**(3):51-66

[20] Jorm AF, Morgan AJ, Hetrick SE. *Relaxation for depression*. *Cochrane Database of Systematic Reviews*. 2008;**8**(4):1-3

[21] Chang BH, Dusek JA, Benson H. *Psychobiological changes from relaxation response elicitation: Long-term practitioners vs. novices*. *Psychosomatics*. 2011;**52**(6):550-559

[22] Ramasamy S, Panneerselvam S, Govindharaj P, Kumar A, Nayak R. *Progressive muscle relaxation technique on anxiety and depression among persons affected by leprosy*. *Exercise Rehabilitation*. 2018;**14**(3):375-381

[23] Goretti B, Portaccio E, Zipoli V. *Coping strategies, psychological variables and their relationship with quality of life in multiple sclerosis*. *Neurological Sciences*. 2009;**30**(1):15-20

[24] Kneebone I, Dunmore E. *Attributional style and symptoms of depression in persons with multiple sclerosis*. *Behavioral Medicine*. 2004;**11**(2):110-115

[25] Schumann R, Adamaszek M, Sommer N, Kirkby KC. *Stress, depression and antidepressant treatment options in patients suffering from multiple sclerosis*. *Current Pharmaceutical Design*. 2012;**18**(36):5837-5845

[26] Alschuler KN, Ehde DM, Jensen MP. *The co-occurrence of pain and depression in adults with multiple sclerosis*. *Rehabilitation Psychology*. 2013;**58**(2):217-221

[27] Isa MR, Moy FM, Abdul Razack AH, Zainuddin ZM, Zainal NZ. *Impact of applied progressive deep muscle relaxation training on the level of depression, anxiety and stress among prostate cancer patients: Quasi-experimental study*. *Asian Pacific Journal of Cancer Prevention*. 2013;**14**(4):2237-2242

[28] Cafarella PA, effing TW, usmani Z-A, frith PA. *Treatments for anxiety and depression in patients with chronic obstructive pulmonary disease: A literature review*. *Respirology*. 2012;**17**(4):627-638

[29] Fernando LV, Angela T, Vanessa B, Olga D, Patricia O, Elisabet H. *Comparison of relaxation training with a cognitive-behavioural intervention for indicated prevention of depression in university students: A randomized controlled trial*. *Psychiatric Research*. 2012;**46**(11):1456-1463

[30] Hashim HA, Hanafi Ahmad Yusof H. *The effects of progressive muscle relaxation and autogenic relaxation on young soccer players' mood states*. *Asian Journal of Sports Medicine*. 2011;**2**(2):99-105

[31] Chang B, Casey A, Dusek JA, Benson H. *Relaxation response and spirituality: Pathways to improve psychological outcomes in cardiac rehabilitation*. *Psychosomatic Research*. 2010;**69**(2):93-100

[32] Lolak S, Connors GL, Sheridan MJ. *Effects of progressive muscle relaxation training on anxiety and depression in patients enrolled in an outpatient pulmonary rehabilitation program*. *Psychotherapy and Psychosomatics*. 2008;**77**(2):119-125

- [33] Persson AL, Veenhuizen H, Zachrisson L, Gard G. Relaxation as treatment for chronic muscular skeletal pain a systematic review of randomized controlled studies. *Physical Therapy Reviews*. 2008;**13**(5):355-365
- [34] Pawlow LA, O'Neil PM, Malcolm RJ. Night eating syndrome: Effects of brief relaxation training on stress, mood, hunger, and eating patterns. *Obesity*. 2003;**27**(8):970-978
- [35] McGrady AV, Kern-Buell C, Bush E, Devonshire R, Claggett AL, Grubb BP. Biofeedback-assisted relaxation therapy in neurocardiogenic syncope: A pilot study. *Applied Psychophysiology and Biofeedback*. 2003;**28**(3):183-192
- [36] Sloman R. Relaxation and imagery for anxiety and depression control in community patients with advanced cancer. *Cancer Nursing*. 2002;**25**(6):432-435
- [37] Weber C, Arck P, Mazurek B, Klapp BF. Impact of a relaxation training on psychometric and immunologic parameters in tinnitus sufferers. *Psychosomatic Research*. 2002;**52**(1):29-33
- [38] Luebbert K, Dahme B, Hasenbring M. The effectiveness of relaxation training in reducing treatment-related symptoms and improving emotional adjustment in acute non-surgical cancer treatment: A meta-analytical review. *Psycho-Oncology*. 2001;**10**(6):490-502
- [39] Artemiadis AK, Vervainioti AA, Alexopoulos EC, Rombos A, Anagnostouli MC, Darviri C. Stress management and multiple sclerosis: A randomized controlled trial. *Archives of Clinical Neuropsychology*. 2012;**27**(4):406-416
- [40] Dabson KE, Mohamadkhani P. Psychometric characteristics of BDI-II in patients of MDD. *Rehabilitation*. 2007;**8**(29):104-111
- [41] Wang YP, Gorenstein C. Assessment of depression in medical patients: A systematic review of the utility of the Beck depression inventory-II. *Clinics (São Paulo, Brazil)*. 2013;**68**(9):1274-1287
- [42] Firth N. Effectiveness of psychologically focused group interventions for multiple sclerosis: A review of the experimental literature. *Health Psychology*. 2014;**19**(6):789-801
- [43] Stepleman LM, Decker M, Rollock M, Casillas R, Brands T. Depression screening in black Americans with multiple sclerosis. *Psychology, Health & Medicine*. 2014;**19**(1):33-39
- [44] Tepavcevic DK, Pekmezovic T, Stojsavljevic N, Kostic J, Basuroski ID, Mesaros S, et al. Predictive value of health-related quality of life in progression of disability and depression in persons with multiple sclerosis: A 3-year study. *Acta Neurologica Belgica*. 2013;**113**(4):403-409
- [45] Nielsen-Prohl J, Saliger J, Güldenbergl V, Breier G, Karbe H. Stress stimulated volitional coping competencies and depression in multiple sclerosis. *Psychosom Research*. 2013;**74**(3):221-226
- [46] Donnchadha OS, Burke T, Bramham J, O'Brien MC, Whelan R, Reilly R, et al. Symptom overlaps in anxiety and multiple sclerosis. *Multiple Sclerosis*. 2013;**19**(10):1349-1354
- [47] Sarısoy G, Terzi M, Gümüş K, Pazvantoğlu O. Psychiatric symptoms in patients with multiple sclerosis. *General Hospital Psychiatry*. 2013;**35**(2):134-140
- [48] Wood B, van der Mei IA, Ponsonby AL, Pittas F, Quinn S, Dwyer T, et al. Prevalence and concurrence of anxiety, depression and fatigue over time in multiple sclerosis. *Multiple Sclerosis*. 2013;**19**(2):217-224

- [49] Jones KH, Ford DV, Jones PA, John A, Middleton RM, Lockhart-Jones H, et al. A large-scale study of anxiety and depression in people with multiple sclerosis: A survey via the web portal of the UK MS register. *PLoS ONE*. 2012;7(7):419
- [50] Ghajarzadeh M, Sahraian MA, Fateh R, Daneshmand A. Fatigue, depression and sleep disturbances in Iranian patients with multiple sclerosis. *Acta Medica Iranica*. 2012;50(4):244-249
- [51] Sjonnesen K, Berzins S, Fiest K.M, M Bulloch A.G, Metz L.M, Thombs B.D and Patten S.B. Evaluation of the 9-item patient health questionnaire (PHQ-9) as an assessment instrument for symptoms of depression in patients with multiple sclerosis. *Postgraduate Medicine* 2012;124(5):69-77
- [52] Pozzilli C, Schweikert B, Ecari U, Oentrich W, Bugge JP. Quality of life and depression in multiple sclerosis patients: Longitudinal results of the BetaPlus study. *Neurologija*. 2012;259(11):2319-2328
- [53] Dubayova T, Krokavcova M, Nagyova I, Rosenberger J, Gdovinova Z, Middel B, et al. Type D, anxiety and depression in association with quality of life in patients with Parkinson's disease and patients with multiple sclerosis. *Quality of Life Research*. 2013;22(6):1353-1360
- [54] Fiest KM, Patten SB. The multiple sclerosis depression rating scale. *Expert Review of Neurotherapeutics*. 2012;12(9):1053-1055
- [55] Labuz-Roszak B, Kubicka-Bączyk K, Pierzchała K, Machowska-Majchrzak A, Skrzypek M. Fatigue and its association with sleep disorders, depressive symptoms and anxiety in patients with multiple sclerosis. *Neurologia i Neurochirurgia Polska*. 2012;46(4):309-317
- [56] Moore P, Hirst C, Harding KE, Clarkson H, Pickersgill TP, Robertson NP. Multiple sclerosis relapses and depression. *Psychosom Research*. 2012;73(4):272-276
- [57] Brown RF, Valpiani EM, Tennant CC, Dunn SM, Sharrock M, Hodgkinson S, et al. Longitudinal assessment of anxiety, depression, and fatigue in people with multiple sclerosis. *Psychology and Psychotherapy: Theory, Research and Practice*. 2009;82(1):41-56
- [58] Kehler MD, Hadjistavropoulos HD. Is health anxiety a significant problem for individuals with multiple sclerosis? *Behavioral Medicine*. 2009;32:150-161
- [59] Tanaya NS, Rona M. Fatigue and social impairment in multiple sclerosis: The role of patients' cognitive and behavioral responses to their symptoms. *Psychosomatic Research*. 2006;61(5):587-593
- [60] Burns MN, Nawacki E, Siddique J, Pelletier D, Mohr DC. Prospective examination of anxiety and depression before and during confirmed and pseudo exacerbations in patients with multiple sclerosis. *Psychosomatic Medicine*. 2013;75(1):76-82
- [61] Chen K, Fan Y, Hu R, Yang T, Li K. Impact of depression, fatigue and disability on quality of life in Chinese patients with multiple sclerosis. *Stress and Health*. 2013;29(2):108-112
- [62] Clark CM, Fleming JA. Sleep disturbance, depression, and lesion site in patients with multiple sclerosis. *JAMA Neurology Arch Neurol*. 1992;49(6):641-643
- [63] Wilson P. *Immediate Relief*. Tehran: The Peykan Press; Translated by Tamadon T. 2000. Persian
- [64] Sadok VA, Kaplan H. *Kaplan and Sadock's Synopsis of Psychiatry: Behavioral Sciences—Clinical Psychiatry*.

Tehran, Persian: The Shahre Abe Press;  
Translated by Poorafkari N. 2003

[65] Moran PJ, Mohr DC. The validity of Beck depression inventory and Hamilton rating scale for depression items in the assessment of depression among patients with multiple sclerosis. *Behavioral Medicine*. 2005;**28**(1):35

[66] Schröder A, Heider J, Zaby A. Cognitive behavioral therapy versus progressive muscle relaxation training for multiple somatoform symptoms: Results of a randomized controlled trial. *Cognitive Therapy and Research*. 2013;**37**:296-306

[67] Molina-Rueda F, Pérez de la Cruz S. Multiple sclerosis and relaxation techniques. *Revista Iberoamericana Kinesiology and Physiotherapy*. 2009;**12**(1):28-34. Spanish

[68] Ghafari S, Ahmadi F, Nabavi S.M, Memarian R and Kazemnejad A. Effect of applying progressive muscle relaxation on depression, anxiety and stress in multiple sclerosis patients. *Iran Research in Medical Sciences*. Persian. 2008;**32**(1):47-53