Original Research Paper

EMDR treatment for anxiety in MS patients: A pilot study

Olga C Wallis [ORCID] and Jolanda de Vries

Abstract

Background: Patients with multiple sclerosis (MS) often experience high levels of anxiety, specifically about the (unpredictable) future related to MS. Worries about physical and cognitive declines can cause frightening mental representations of future 'worst-case scenarios'. Evidence of the applicability of eye movement desensitization reprocessing (EMDR) using flash-forward on anxiety is growing.
Objective: This pilot study examines the flash-forward EMDR procedure as a treatment option in MS patients suffering from anxiety specifically related to future MS problems.
Methods: Eight MSpatients suffering from anxiety were treated with one to three sessions of EMDR with a flash-forward target. Treatment effects were evaluated with the use of questionnaires on anxiety, depression, worry, cognitive avoidance, and quality of life at three time points: pre-treatment, direct post-treatment, and three-month follow-up.
Results: Significant improvement was shown post-treatment compared to pre-treatment on anxiety, depression, and worry. In a case series analysis, all but one participant showed a clinically important difference in anxiety.
Conclusion: Before implementation on a larger scale can be recommended, the value of EMDR with flash forward targets for anxiety in MS need to be further examined. However, the positive results on this pilot can be seen as promising and motivation for future studies.

Introduction

Multiple sclerosis and anxiety

Multiple sclerosis (MS) patients suffer from high levels of anxiety. The lifetime prevalence of anxiety disorders ranges from 20% to 45% throughout the course of MS,[1] and well exceeds the anxiety disorder lifetime prevalence in healthy individuals of 13%.[2] Anxiety and other psychological symptoms have been found to be more important predictors of quality of life (QoL) in MS patients than physical symptoms and neurological impairment.[3] Anxiety can aggravate disease symptoms, such as fatigue and cognitive complaints, and has a negative influence on one's work and social life.[4] A high level of anxiety at diagnosis remains and even worsens in the following years if unnoticed or untreated.[5] On top of that, since MS patients with anxiety are much more likely to have suicidal intent (46%) compared with those without anxiety (18.9%).[6] Early diagnosis and treatment of anxiety is essential.

The precise focus of anxiety or worries in MS patients is not well defined. It seems that patients have more concerns about their future than about the impact of MS in the present.[7] This negative anticipation is confirmed with functional magnetic resonance imaging (fMRI) data in healthy controls.[8] The brain activity of emotion processing in anticipating pictures has been studied with the use of fMRI. Activated brain areas corresponding to pictures of unknown valence have been shown to be

Correspondence to:
Olga C Wallis,
Department of Medical
Psychology, Elisabeth-
TweeSteden Hospital,
Elisabeth, Attn. O.C. Wallis,
Postbus 90151, 5000 LC
Tilburg, the Netherlands.
o.wallis@etz.nl

Olga C Wallis,
Department of Medical
Psychology, ETZ Hospital,
Tilburg, the Netherlands

Jolanda de Vries,
Department of Medical
Psychology, ETZ Hospital,
Tilburg, the Netherlands
Department of Medical and
Clinical Psychology, Tilburg
University, Tilburg, the
Netherlands

similar to fMRIs anticipating unpleasant pictures. When pleasant pictures were expected, brain activity was significantly different. Although the sample size in this study was small, the findings suggest that in unknown situations, people tend to expect the worst-case scenario.[8]

Since the course of MS is unpredictable, patients can develop a negative disease-related anticipation. The only study on MS patients examining negative thoughts about the future showed that depressed MS patients reported significantly more MS related future negative experiences than those in a non-depressed MS group, although they did not differ in the amount of negative thoughts.[9]

Although not well studied, negative disease-related anticipation may play a role in anxiety and mood problems in people suffering from MS.

Treatment options for anxiety in MS

There are several psychological therapies available to treat anxiety. In the case of MS patients, the number of studies examining the effectiveness of anxiety treatment in MS patients using different forms of psychological therapy is limited. Studies investigating cognitive behavioural therapy (CBT) confirm that it can lower distress or anxiety in 11 sessions.[10] In a review by Simpson et al.,[11] mindfulness-based interventions, a type of third-generation CBT, were examined in MS patients. In this case, the positive treatment outcome was not very convincing. It was concluded that *some* MS patients benefit from mindfulness-based interventions in terms of QoL, mental health, and some physical health measures.[11] More recently, eight sessions of mindfulness-integrated CBT (MiCBT) were found to be effective in lowering anxiety compared to treatment as usual (TAU) in female MS patients.[12] The treatment results of acceptance and commitment therapy (ACT), also a type of third-generation CBT, showed that psychological wellbeing scores in MS patients improved after eight two-hour ACT sessions compared to no treatment.[13] When comparing ACT to relaxation treatment (RT), there was no significant difference found in the outcome variables, among which was an anxiety scale.[14]

In sum, some form of CBT is the only evidence-based treatment to reduce anxiety in people with MS. However, the results on the reduction of anxiety are mixed, and treatment usually consists of eight to 11 sessions.

Eye movement desensitization reprocessing treatment

Eye movement desensitization reprocessing (EMDR) therapy is a type of third-generation CBT and an evidence-based treatment for post-traumatic stress disorder (PTSD).[15] During EMDR, traumatic memories are desensitized, negative beliefs are reformulated, and physiological arousal is reduced. In the standard procedure, the patient is exposed to two elements simultaneously: (1) The patient focuses on the most emotionally loaded image(s) with associated physical sensations; (2) At the same time, bilateral stimulation is offered to the patient. The standardised protocol of EMDR, bilateral stimulation consist of eye movements (other options include taps or tones). Along with the elicited image, the spontaneous emergence of insights, emotions, physical sensations, and other memories is facilitated, guided by a trained professional.[16] Seven out of ten studies have shown that EMDR therapy requires fewer sessions and/or is more effective than trauma-focused CBT.[16] Only 1–2 hours of EMDR therapy targeting anxious autobiographical memories can be enough to result in a decrease of anxiety.[17]

In recent years, the scope for the use of EMDR has been expanded. Research has indicated potential applications for patients with stress-related disorders as well as those suffering from a wide range of physical conditions.[16] Several studies have shown that EMDR can decrease the emotional intensity of anxiety, not only in cases of PTSD but also with induced anxiety in healthy controls.[17] EMDR has also been applied to treat panic disorders[18] and a variety of adverse life experiences.[16]

Shapiro has suggested that the traumatic impact of dealing with life-threatening, incapacitating disease can be mitigated by incorporating a few EMDR sessions to address fears of the future aside the distressing targets in the past.[16] Elaborating on this, the recent published EMDR protocol on PTSD symptoms specifically in MS patients underlines the ongoing and future oriented stressor in this specific patient group. Beside the standard procedures on the targets based on traumatic memories, targets about the future are incorporated (examples given; fear of being confined to a wheelchair, fear of relapsing episodes, fear of the progression of the disease).[19]

In line with this, EMDR with the flash-forward procedure has been suggested (EMDR ff) if there is not a PTSD disorder or a past event that appears to be at

the root of the patients current anxiety.[20] Research on EMDR treatment specifically on anxiety without PTSD symptoms in patients with physical diseases is scarce. Decrease in anxiety and depression has been shown after 12–14 therapeutic weekly sessions of EMDR therapy in glioblastoma multiforme patients.[21] Also there was a positive treatment effect of the EMDR intervention on anxiety and depression levels among patients undergoing hemodialysis.[22]

Despite the value of these findings, no research has been found on EMDR specifically focused on anxiety related to the future in other medical diseases like MS.

Aim of the study

Anxiety in MS patients can be specifically related to negative disease-related anticipation. EMDR ff can possibly decrease anxiety and physical tension incurred by contemplating future 'worst-case scenarios'. However, this form of EMDR application on anxiety has not yet been studied in neurological disease cases. Thus, this pilot study examined the EMDR ff procedure as a treatment option in MS patients suffering from anxiety specifically related to future MS problems.

Methods

Participants and procedure

Eight patients with a diagnosis of MS or clinically isolated syndrome (CIS) and a score above the cut-off on the screening questionnaire were included in this study at the MS outpatient clinic at Elisabeth Tweesteden Hospital (ETZ) in Tilburg, the Netherlands. MS was diagnosed using the McDonald criteria of 2010.[23] In one case, the MS criteria was not met, and the patient was diagnosed with CIS. CIS is defined as a first neurologic event suggestive of MS lasting for at least 24 hours and with symptoms and signs indicating a minimum of one lesion within the central nervous system.[24] Inclusion of participants occurred in different ways. First, during regular check-ups with their neurologist or nurse, patients with anxiety problems, defined by the anxiety score of the Hospital Anxiety and Depression Scale (HADS-A ≥ 8), were given written and oral information about the study. Patients were then asked for permission to be telephoned by the researcher. Another inclusion route was via one of the MS information meetings in the hospital where information about the study was provided. Patients of the ETZ hospital could

complete the HADS and received study information to take home and had one week to consider participating. If patients had anxiety problems and were motivated for participation, they were invited for an interview at the hospital's Department of Medical Psychology by the researcher. At this interview, the inclusion and exclusion criteria were evaluated, and all participants signed an informed consent form. Exclusion criteria were as follows: below the age of 18, insufficient Dutch language proficiency, severe psychiatric comorbidity (i.e., dissociation or high suicide risk), or other psychological treatment at the same time. Patients taking medication for anxiety were not excluded, although in this sample, there were no such cases. The inclusion criteria consisted of the following: the reported anxiety (HADS-A ≥ 8) was related to the future, and the object of the anxiety consisted of one or more worst-case scenarios that the patient was struggling with. To help identify the client's ultimate catastrophic scenario, the therapist asked additional questions leading to the ultimate conclusion to make sure that the worst scenario had been considered.[20]

The study was conducted according to the Declaration of Helsinki and approved by the Ethics Committee of Brabant.

Treatment

All participants attended treatment at the Department of Medical Psychology at ETZ. Each participant was assigned to one of the psychologists who carried out the treatment, consisting of a maximum of three sessions of EMDR. The standardised EMDR protocol written by Jongh and Broeke (adapted into Dutch in 2003) was used for the flash-forward target.[20,25] Each session lasted a maximum of 90 minutes. The amount and length of the sessions could be shorter if the protocol was completed earlier. In the first session, participants were asked to describe their worst-case scenarios for the future in relation to MS. No more than three flash-forward targets that presently caused the most tension or disturbance were selected. These three (or less) targets were used for EMDR.

Therapists

In each case, EMDR therapy was administered by one of four psychologists (among which was the main researcher). All four had EMDR certification, membership in the Dutch EMDR association (VEN), and experience with EMDR therapy.

Measurements

A baseline measurement was performed after the interview with the main researcher (Time0). The same measurement was repeated within two weeks after the last treatment (Time1) and then three months after the last treatment (Time2). The measurement consisted of the primary outcome measure on the HADS-A and the scores on the following secondary outcome measures: HADS-Depression (HADS-D), Penn State Worry Questionnaire (PSWQ), Cognitive Avoidance Questionnaire (CAQ), and World Health Organisation Quality of Life (WHOQOL-bref).

HADS. The HADS is specifically designed to measure mood disturbance in people with physical illness and has proven to be a reliable and valid instrument for assessing anxiety and depression in medical patients. The HADS not only gives clinically meaningful results as a psychological screening tool, but is also sensitive to changes in response to psychotherapeutic intervention.[26] HADS scores for Time0 were obtained from the inclusion procedures.

PSWQ. Worry is seen as a cognitive process concerning repetitive focus on negative thoughts. Worry may be responsible for the maintenance of emotional distress, especially anxiety.[27] The PSWQ has been found to be a valid instrument for assessing worry, and the test-retest reliability is adequate.[28] Although there is not a norm group specific for MS or neurological patients, the PSWQ was used to examine worry in MS.[27]

CAQ. More cognitive avoidance has been proven to predict an increase in daily anxiety.[29] The level of cognitive avoidance can be measured with the CAQ, which has been reported to have excellent psychometric properties,[30] although it has not yet been researched for its use in MS patients.

WHOQOL-Bref. Treatment effects concerning QoL in MS are best evaluated using the WHOQOL-BREF, although there is not a norm group specific for MS patients.[31]

Statistical analyses

To evaluate the effectiveness of EMDR, all post-treatment measures (Time1) were compared to those taken at pre-treatment (Time0) using paired t-tests. Additionally, paired t-tests were used to analyse the follow-up measures (Time2) in comparison with those taken at post-treatment (Time1) to see if treatment effect remained stable over time. Because

there was one dropout between Time1 and Time2, i.e., subject 3, and there was already a small sample, we chose not to use a repeated measures analysis.

To evaluate whether the effects were clinically relevant, effect size Cohen's d was calculated for all measures. The strength of the effect was labelled as small: $d = .20$, medium: $d = .50$, or large:

$d = .80$.[32] All analyses were conducted using IBM SPSS Statistics version 24 for Windows.

To evaluate the treatment effect per subject, a minimal clinical important difference (MCID) was used. The MCID of the HADS is estimated to be 1.32 for the HADS anxiety score, corresponding to a change from baseline of around 20%.[33]

Results

Patient characteristics

Initially, ten patients with MS or CIS participated in the study. Two of them dropped out after the pre-measurement. Since they did not attend an EMDR session, they were excluded from the study. Of the eight remaining participants, one did not complete the questionnaires at Time2.

The demographic and clinical characteristics of the eight participants are listed in Table 1. All but one were female, and the mean age was 42.3 years (ss = 10.2; range 28–56). Earlier psychological treatment included different kinds of treatment given by registered psychologists. The contents of the frightening mental representations were different for each patient, and examples of the flash-forward targets used in the EMDR sessions included lying in bed without being able to move, sitting in a wheelchair, being in a nursery home, and seeing one's family grieving.

Treatment outcomes

In Table 2, the treatment effects of all questionnaires are listed. Significant improvement is shown before (Time0) and after treatment (Time2), not only in terms of the primary outcome scores of the HADS-A, but also for those on the HADS-D, HADS total, and PSWQ. Both the CAQ and the WHOQOL scores did not show a significant change. Effect sizes on the HADS-A, HADS-D, and HADS were very large, and on the PSWQ, the effect size was large.

Scores on the questionnaires at Time2 were compared with the scores at Time3. As can be seen in

Table 1. Patients characteristics.

Subject	Gender	Age	Education	Employement	MS form	Time since diagnose (years)	Comorbid disease	Earlier psychological treatment	MOCA	HADS -A pre
1	f	56	Vocational	Unemployed	RRMS	22	Yes	Yes	26	14
2	f	47	Secondary school	Unemployed	RRMS	18	Yes	No	21	11
3	f	28	Vocational	Unemployed	RRMS	1	No	Yes	25	8
4	m	44	Vocational	Employed	CIS	1	Yes	No	26	12
5	f	30	College	Employed	RRMS	2	Yes	No	25	9
6	f	39	Vocational	Employed	CIS	1	Yes	Yes	26	10
7	f	40	Vocational	Employed	RRMS	1	Yes	Yes	27	15
8	f	54	Community college	Unemployed	Spinal MS	1	Yes	Yes	26	11

f: female; m: male; RRMS: relapsing remitting MS; CIS: Clinical Isolated Syndrome; MOCA: Montreal Cognitive Assessment; HADS-A pre = Hospital Anxiety and Depression Scale - Anxiety pre-treatment.

Table 2. Effects Time0 – Time1.

	Pre mean (SD)	Post mean (SD)	t	Sig (2 tailed)	Effect size (Cohen's D)	Effect size (Cohen's D)
HADS A	11.3 (2.4)	7.5 (2.6)	4,465	p = .003	1,579	1.579
HADS D	6.5 (2.4)	3.4 (2.9)	4,079	p = .005	1,442	1.442
HADS total	17.8 (4.0)	10.9 (4.1)	5,338	p = .001	1,887	1.887
PSWQ	52.9 (7.1)	45.3 (12.6)	2,507	p = .041	0.887	0.887
CAQ	58.5 (14.0)	48.5 (17.5)	2,169	p = .067	0.767	0.767
WHOQOL	5.9 (1.4)	6.5 (0.5)	−1,667	p = .140	0.589	0.589

HADS A: Hospital Anxiety and Depression Scale, anxiety score; HADS D: Hospital Anxiety and Depression Scale, depression score; PSWQ: Penn State Worry Questionnaire; CAQ: Cognitive Avoidance Questionnaire; WHOQOL: World Health Organisation Quality of Life.

Table 3, no significant changes were found in the scores on the questionnaires between both time points.

Case series analysis

All but one participant showed more than the cut-off MCID of anxiety on the primary outcome HADS-A, i.e., Time0 compared to Time1. The only patient who did not show a reduction in anxiety was also the only patient who did not complete the questionnaires at Time2.

Scores at Time2 show variable results. Using MCID to mark clinical effects, two of the patients showed further improvement, two of the patients showed an increase in anxiety, and three patients retained the treatment effect. None of the participants had the same anxiety scores as those taken at pre-measurement. The results are shown in Figure 1.

Discussion

This pilot study aimed to investigate the possible usefulness of EMDR ff in MS patients with anxiety about the future. Even in a small sample size of eight participants, significant group effects were found by comparing pre-treatment and post-treatment scores assessing patients' anxiety. After EMDR treatment, patients were less anxious (HADS-A) and also had fewer depressive symptoms (HADS-D) and less worrying thoughts (PSWQ). Effects on cognitive avoidance and QoL did not reach the significance level, most likely due to the small sample size.

At follow-up, three months after the last session, patients did not show significant improvement or relapse on all variables, indicating that the EMDR treatment effects remained stable over time, at least in the short term.

Table 3. Effects Time1 – Time2.

	Post mean (SD)	Follow up mean (SD)	t	Sig (2 tailed)	Effect size (Cohen's D)
HADS A	7.43 (2.760)	7.71 (3.861)	−0.311	.766	−0.118
HADS D	3.29 (3.147)	6.14 (3.625)	−1.759	.129	−0.665
HADS total	10.71 (4.386)	13.86 (5.429)	−1.416	.206	−0.535
PSWQ	47.67 (13.779)	49.00 (9.778)	−0.528	.620	−0.215
CAQ	50.00 (18.339)	47.29 (11.116)	0.665	.531	0.251
WHOQOL	6.57 (0.535)	5.86 (1.069)	1.987	.094	0.751

HADS A: Hospital Anxiety and Depression Scale, anxiety score; HADS D: Hospital Anxiety and Depression Scale, depression score; PSWQ: Penn State Worry Questionnaire; CAQ: Cognitive Avoidance Questionnaire; WHOQOL: World Health Organisation Quality of Life.
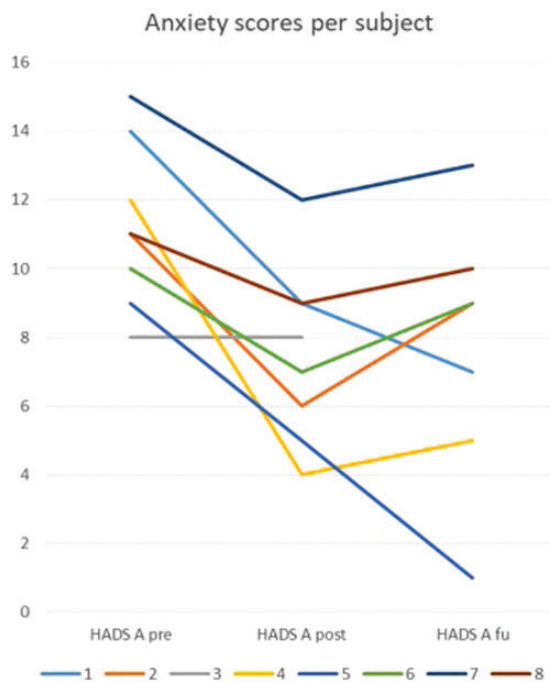

Figure 1. Anxiety scores over time of all subjects. HADS A pre: Hospital Anxiety and Depression Scale; anxiety score before treatment; HADS A post: Hospital Anxiety and Depression Scale; anxiety score after treatment; HADS A fu: Hospital Anxiety and Depression Scale; anxiety score follow up (3 months).

The positive treatment effect was confirmed when looking at the individual patients. Therapeutic response to anxiety symptoms, as determined by means of an MCID of 20%, showed improvement after therapy for all but one patient. The only patient who did not improve (patient 3) did not complete follow up questionnaires. We are not sure if she did not want to complete the questionnaires because of the lack of treatment effect in her case. Another distinct characteristic of this patient is the lowest anxiety score of all patients before treatment, i.e., the cut-off score (8). The uncertainty concerning which HADS cut-off score to use in MS samples is described in the published literature to date. Previous studies have used different cut-off scores ranging from eight or higher to 11 or higher to classify anxiety.[34] However, patient 5 started with an anxiety score of nine, but did benefit from treatment, thus supporting the cut-off value used here.

The positive treatment effect on anxiety and depression symptoms is in line with results of EMDR treatment for anxiety in glioblastoma multiforme patients,[21] and patients undergoing hemodialyses.[22] Presumptive evidence of a decrease of worrying thoughts after EMDR therapy has also been found in three female patients with generalised anxiety disorder.[35]

The most important limitations of this study are the sample size and the lack of a control group. Because of the small sample size, there was no control group added to filter out nonspecific therapeutic effects or spontaneous recovery over time. However, earlier research showed that high levels of anxiety at diagnosis MS, if not treated, can remain and even worsen in the following years.[5] Due to the small number of treated patients, we were not able to define patient characteristics that determine current positive treatment outcomes. The difficulty of including large sample sizes in a short amount of time is striking because the prevalence of anxiety in MS is high.[1] The fact that we could not include a larger sample in the present study may be explained by a few reasons. To begin with, the group of MS patients subject to inclusion was not a representative sample. All patients were recruited from the multidisciplinary

MS treatment at ETZ. In this sample, all patients were followed by several professionals, and if high anxiety scores occurred, TAU could be attained. Only two of the eight included subjects had been diagnosed with MS more than two and a half years prior. Therefore, patients may already have been treated for their anxiety within the first few years of their diagnosis, resulting in a lower prevalence of anxiety in our sample.

In conclusion, offering EMDR ff to MS patients with anxiety for the future may be a fast way to significantly reduce this anxiety. Remarkable is the short duration of the treatment (maximum three sessions of 90 minutes). However, the small sample size is an important limitation of our study in terms of generalization and conclusions that we can draw from this study. Before implementation on a larger scale can be recommended, the value of EMDR ff in somatic population with anxiety for future perspectives need to be further examined, preferably by doing randomised controlled trials comparing EMDR to TAU. Additionally, assessing the effectiveness of EMDR combined with other anxiety treatment options would be important to investigate in future studies. The clinical relevant improvement in reducing anxiety in MS participants in this study are promising for future randomised studies with larger sample sizes.

ORCID iD

Olga C Wallis (iD) https://orcid.org/0000-0001-9915-7881

References

1. Wood B, Van Der Me IAF, Ponsonby AL, et al. Prevalence and concurrence of anxiety, depression and fatigue over time in multiple sclerosis. *Mult Scler J* 2013; 19: 217–224.
2. Smeets MAM, Dijs MW, Pervan I, et al. Time-course of eye movement-related decrease in vividness and emotionality of unpleasant autobiographical memories. *Memory* 2012; 20: 346–357.
3. Butler E, Matcham F and Chalder T. A systematic review of anxiety amongst people with multiple sclerosis. *Mult Scler Related Disorders* 2016; 10: 145–168.
4. Sá MJ. Psychological aspects of multiple sclerosis. *Clin Neurol Neurosurgery* 2008; 110: 868–877.
5. Janssens ACJW, Buljevac D, van Doorn PA, et al. Prediction of anxiety and distress following diagnosis of multiple sclerosis: a two-year longitudinal study. *Mult Scler* 2006; 12: 794–801.
6. Korostil M and Feinstein A. Anxiety disorders and their clinical correlates in multiple sclerosis patients. *Mult Scler* 2007; 13: 67–72.
7. Buchanan RJ, Minden SL, Chakravorty BJ, et al. A pilot study of young adults with multiple sclerosis: demographic, disease, treatment, and psychosocial characteristics. *Disability Health J* 2010; 3: 262–270.
8. Herwig U, Kaffenberger T, Baumgartner T, et al. Neural correlates of a "pessimistic" attitude when anticipating events of unknown emotional valence. *NeuroImage* 2007; 34: 848–858.
9. Moore AC, MacLeod AK, Barnes D, et al. Future-directed thinking and depression in relapsing-remitting multiple sclerosis. *British J Health Psychol* 2006; 11: 663–675.
10. Askey-Jones S, David AS, Silber E, et al. Cognitive behaviour therapy for common mental disorders in people with multiple sclerosis: a bench marking study. *Behav Res Ther* 2013; 51: 648–655.
11. Simpson R, Booth J, Lawrence M, et al. Mindfulness based interventions in multiple sclerosis – a systematic review. *BMC Neurol* 2014; 14: 1–9.
12. Bahrani S, Zargar F, Yousefipour G, et al. The effectiveness of mindfulness-integrated cognitive behavior therapy on depression, anxiety, and stress in females with multiple sclerosis: a single blind randomized controlled trial. *Iran Red Crescent Med J* 2017; 19: e44566.
13. Bayati A, Abbasi P, Bashiri H, et al. The effectiveness of acceptance and commitment therapy on psychological well-being in women with MS. *Iioab J* 2017; 8: 82–86.
14. Nordin L and Rorsman I. Cognitive behavioural therapy in multiple sclerosis: a randomized controled pilot study of acceptance and comitment therapy. *J Rehabil Med* 2012; 44: 87–90.
15. Shapiro F. Eye movement desensitization and reprocessing (EMDR) and the anxiety disorders: clinical and research implications of an integrated psychotherapy treatment. *J Anxiety Disord* 1999; 13: 35–67.
16. Shapiro F. The role of eye movement desensitization and reprocessing (EMDR) therapy in medicine: addressing the psychological and physical symptoms stemming from adverse life experience. *Perm J* 2014; 18: 71–77.
17. Rathschlag M and Memmert D. Reducing anxiety and enhancing physical performance by using an advanced

version of EMDR: a pilot study. *Brain Behav* 2014; 4: 348–355.

18. Horst F, Den Oudsten B, Zijlstra W, et al. Cognitive behavioral therapy vs. eye movement desensitization and reprocessing for treating panic disorder: a randomized controlled trial. *Front Psychol* 2017; 8: 1–9.

19. Luber M. *EMDR therapy scripted protocols and summary sheets: eye movement desensitization and reprocessing: treating trauma in somatic and medical-related conditions*. New York: Springer Publishing Company, 2019.

20. Logie RDJ and de Jongh A. The 'flashforward procedure': confronting the catastrophe. *J Emdr Prac Res* 2014; 8: 25–32.

21. Szpringer M, Oledzka M and Amann BL. A non-randomized controlled trial of EMDR on affective symptoms in patients with glioblastoma multiforme. *Front Psychol* 2018; 9: 1–8.

22. Rahimi F, Rejeh N, Bahrami T, et al. The effect of the eye movement desensitization and reprocessing intervention on anxiety and depression among patients undergoing hemodialysis: a randomized controlled trial. *Perspect Psychiatr Care* 2019; 55: 652–660.

23. Polman CH, Reingold S, Banwell B, et al. Diagnostic criteria for multiple sclerosis: 2010 revisions to the McDonald criteria. *Ann Neurol* 2011; 69: 292–302.

24. Kappos L, Polman CH, Freedman MS, et al.; for the BENEFIT Study Group. Treatment with interferon beta-1b delays conversion to clinically definite and McDonald MS in patients with clinically isolated syndromes. *Neurology* 2006; 67: 1242–1249.

25. de Jongh A, ten Broeke E and Handboek EMDR. *Een geprotocolleerde behandelmethode voor de gevolgen van psychotrauma*. 6th ed. Amsterdam: Pearson Assessment and Information B.V., 2006.

26. Herrmann C. International experiences with the hospital anxiety and depression scale – a review of validation data and clinical results. *J Psychosom Res* 1997; 42: 17–41.

27. Thornton EW, Tedman S, Rigby S, et al. Worries and concerns of patients with multiple sclerosis: development of an assessment scale. *Mult Scler* 2006; 12: 196–203.

28. Meyer TJ, Miller ML, Metzger RL, et al. Development and validation of the penn state worry questionnaire. *Behav Res Ther* 1990; 28: 487–495.

29. Dickson KS, Ciesla JA and Reilly LC. Rumination, worry, cognitive avoidance, and behavioral avoidance: Examination of temporal effects. *Behav Ther* 2012; 43: 629–640.

30. Gosselin P, Langlois F, Freeston MH, et al. The cognitive avoidance questionnaire (CAQ): development and validation among adult and adolescent samples. *Ournal de Therapie Comportementale et Cognitive* 2002; 12: 24–37.

31. Wynia K, Middel B, de Ruiter H, et al. Adding a subjective dimension to an ICF-based disability measure for people with multiple sclerosis: development and use of a measure for perception of disabilities. *Disabil Rehabil* 2009; 31: 1008–1017.

32. Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd ed. New York: Lawrence Erlbaum Associates, 1988.

33. Puhan MA, Frey M, Büchi S, et al. The minimal important difference of the hospital anxiety and depression scale in patients with chronic obstructive pulmonary disease. *Health Qual Life Outcomes* 2008; 6: 46.

34. Honarmand K and Feinstein A. Validation of the hospital anxiety and depression scale for use with multiple sclerosis patients. *Mult Scler* 2009; 15: 1518–1524.

35. Rezvani F, Dowlatabadi S and Behzadi S. The effectiveness of eye movement desensitization and reprocessing (EMDR) in reducing pathological worry in patients with generalized anxiety disorder: a preliminary study. *Arch Psych Psych* 2015; 17: 33–43.