EMDR Treatment of Migraine

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This pilot study was conducted at Gaziosmanpaşa Hospital, Istanbul, to investigate the effectiveness of eye movement desensitization and reprocessing (EMDR) on migraine headache by specifically treating traumas related to headaches. The sample consisted of 11 Turkish participants with chronic daily headache: 9 women (mean age of 31.7 years) and 2 men (mean age of 30.5 years). Participants had a history of migraine ranging from 2 to 30 years (mean = 12 years). Variables included participant daily ratings of headache frequency, duration, and intensity; medication intake; hospital emergency room (ER) visits; and scores on the Symptom Assessment-45 Questionnaire. The results showed a significant decrease in headache frequency and duration with no reduction in pain intensity. There was a significant decrease in the use of painkillers and ER visits. All results were maintained at 3-month follow-up, providing some preliminary evidence that EMDR may be effective and useful as an alternative treatment for migraine.

Keywords: EMDR; migraine; EMDR headache protocol

Chronic headaches are one of the most common and disabling problems that a person can have. The World Health Organization (WHO, 2004) reports that up to 1 in 20 adults has a headache nearly every day, and that 3,000 daily migraine attacks occur per each million of the general population. The International Headache Society (IHS, 2004) categorized headaches as falling into two main categories: primary and secondary. Whereas primary headaches are known to have no organic causes as an underlying pathogenesis, secondary headaches have organic causes such as head trauma or a systemic illness. It was reported that 90% of headaches are primary headaches with the most common being the tension-type headache, migraine, and cluster headache (Saip, 2005). Although all these headaches cause substantial levels of disability and significantly disturb the quality and function of daily life, the high prevalence of migraine and its negative impact on the occupational, familial, and social areas are regarded as a major public health issue.

Migraines

The WHO (2004) reported that migraines usually start during adolescence and mostly affect adults aged 35–45 years. However, much younger people including children can suffer from them. European and American studies have shown that 6%–8% of men and 15%–18% of women suffer from migraines every year, with a similar pattern seen in Central and South America. Furthermore, research conducted by the Turkish Headache Epidemiology Study Group in several regions of Turkey showed a higher prevalence rate: 10.9% among men and 21.8% among women (as cited in Siva, 2002).

Worldwide, according to the World Health Organization Global Burden of Disease Study, migraine is the 20th leading cause of years of a healthy life lost to disability (YLDs) on a global level, accounting for 1.4% of total global YLDs. Furthermore, the study claims that the burden of migraine is higher for women (at 2% of total global YLDs), making it the ninth leading cause of disability for them (Leonardi & Mathers,

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2003). Indeed, headaches inflict recognizable burden on patients, which sometimes include substantial personal suffering, impaired quality of life, and financial cost. Repeated headache attacks, and often the constant fear of the next one, damage family life, social life, and employment (WHO, 2004). Such attacks also cause a huge financial burden on employers through lost work productivity and absenteeism (Lipton, Hamelsky, Kolodner, Steiner, & Stewart et al., 2000; Von Korff, Stewart, Simon, & Lipton, 1998) and have cost the United States US$1 billion annually for migraine care (Hu, Markson, Lipton, Stewart, & Berger, 1999).

Apart from its negative impact on social, occupational, and economical dynamics, migraine also has deteriorating effects on sufferers' psychological well-being. A vast amount of research indicates that migraine headaches are often highly associated with mood disorders and anxiety disorders such as depression, anxiety, panic disorder, and bipolar disorder (Beghi et al., 2007; Hamelsky & Lipton, 2006; Kececi, Dener, & Analan, 2003). In their population-based study, Breslau et al. (2000) found that the lifetime prevalence of major depression is about three times higher for people with migraines and other severe headaches. Radat and Swendsen (2005) also investigated the possible mechanisms of comorbidity and found that only phobic disorders seem to predict the onset of migraine, and that a bidirectional chronology exists between migraine and depression or panic disorder. Other research has found a meaningful relationship between chronic pain and posttraumatic stress disorder (PTSD; Asmundson, Norton, Allerdings, Norton, & Larsen, 1998; Chibnall & Duckro, 1994; Geisser et al., 1996; Otis et al., 2010).

Migraine Physiology

Migraine is essentially an episodic headache, usually accompanied by nausea, photophobia, and phonophobia, which may be preceded by focal neurological symptoms (aura) (Lance & Goadsby, 2005). It is considered primarily as a neuronal disorder contrary to its previous categorization as a vascular disorder (May & Goadsby, 1999). Positron emission tomography (PET) scan studies showing the activation of brain stem regions involved in the control of antinociception and vascular functions during spontaneous migraine support the existence of a brain stem "migraine generator" (Weiller et al., 1995). The sensory disturbances during the migraine aura that can precede migraine are now believed to result from a spreading depression or a transient inhibition of neuronal activity that passes across the cerebral cortex (Lauritzen, 1994).

Nicholson, Houle, Rhudy, and Norton (2007) claimed that most of the research and clinical work has focused on the biological factors. These efforts have resulted in important steps toward the treatment and prevention of headaches along with their related disability. This body of research has also revealed that biological factors alone not only fail to account for all aspects of headache and disabilities but they also underscore the importance of psychological factors (Lake, Rains, Penzien, & Lipchik, 2005; Nicholson et al., 2007).

Treatment of Migraine

Pharmacological Treatments

The most common treatment for migraine is pharmacological treatment. The development of acute and preventive treatments over the past 15 years had been a major advance in the management of migraine (Lance & Goadsby, 2005). Pharmacological treatments mainly consist of the following:

1. Prophylactic (preventive) treatment. The goal is to decrease the frequency, severity, and duration of headache attacks, to improve responsiveness to treatment of acute attacks, and to reduce disability by using regular medication for a specific length of time (e.g., 6 months or more). Prophylactic treatments are mostly thought to be suitable for patients having four or more attacks in a month, and antidepressants are the most commonly used medications (Saip, 2005).
2. Acute intervention. Medication is used to abort the headache attack when it is felt to be imminent (Saip, 2005). Even though pharmacological treatments help victims by reducing or aborting their headaches, side effects such as reduced energy, drowsiness, weight gain/loss, depression, parkinsonism, cognitive impairment, leg cramps, dizziness, tiredness, and so on (Lance & Goadsby, 2005), and contraindications because of patients' coexisting conditions can complicate their treatment. The trial-and-error method of determining which patients will respond to which medication is frustrating for the patients as well as physicians (Sprenger & Goadsby, 2009). The diversity of medications used in treating migraine is an indication that none is fully effective, and overusing medication can increase the risk of inducing migraines (Grazzi, Usai, & Bussone, 2007; Lance & Goadsby, 2005).

On the other hand, there is a cluster of patients who are not advised to use medication and/or for whom behavioral treatments may be particularly well suited. According to the U.S. Headache Consortium, these patients may be those who prefer behavioral approaches, those who cannot tolerate or use pharmacological

treatment for various reasons (e.g., during pregnancy), those for whom analgesic or acute medications can increase the severity of headache, or those with serious stressors and/or deficient stress-coping skills (Penzien, Rains, & Andrasik, 2002).

Behavioral Treatments

Behavioral headache treatments are based on the conceptualization of a headache as a psychosomatic disorder; this view emphasizes the important impact of psychological and environmental factors on physical disorders. Behavioral interventions are generally structured to teach various headache management skills in addition to the self-regulation of specific physiological responses through biofeedback or relaxation training (Penzien et al., 2002). On the other hand, cognitive behavioral treatments focus on behavior modification and also on modifying maladaptive patterns of thinking, self-monitoring, stress management, problem solving, and relaxation training (Lipchik, Smitherman, Penzien, & Holroyd, 2006).

Goslin et al. (1999), supported by the Agency for Healthcare Research and Quality (AHRQ), conducted a meta-analysis of the behavioral treatment literature and results for 70 studies and found that relaxation training, thermal biofeedback combined with relaxation, electromyographic biofeedback, and cognitive behavioral therapy were all statistically more effective than wait list control. Other meta-analysis studies also support the former results (e.g., Blanchard & Andrasik, 1982, 1987; Blanchard, Andrasik, Ahles, Teders, & O'Keefe, 1980; Holroyd & Penzien, 1990; Penzien, Holroyd, Holm, & Hursey, 1985). Furthermore, in Blanchard and Andrasik's (1987) follow-up study, 91% of migraine sufferers remained significantly improved 5 years after completing behavioral headache treatment.

Eye Movement Desensitization and Reprocessing and Chronic Pain

Eye movement desensitization and reprocessing (EMDR) is an integrative approach of psychotherapy. Although it was originally developed to reduce or eradicate symptoms of unresolved traumatic memories, it has found a wide application beyond PTSD (Shapiro, 2001). A new area of research has been chronic pain and there have been promising results (e.g., de Roos et al., 2010; Grant & Threlfo, 2002; Mazzola et al., 2009; Schneider, Hofmann, Rost, & Shapiro, 2007, 2008; van Rood & de Roos, 2009).

van Rood and de Roos (2009) reviewed research that investigated EMDR as a treatment for patients with various medically unexplained symptoms, which are somatic symptoms for which no treatable medical cause has been found or previous regular treatments has not improved the symptoms. They tentatively concluded that EMDR might be a beneficial treatment for medically unexplained symptoms on the condition that these complaints are trauma related (i.e., the present complaint is etiologically associated with or maintained by unprocessed traumatic events or negative life experiences). According to these studies, processing such memories using standard EMDR protocol may decrease related physical and psychological symptoms.

Grant and Threlfo (2002) and Mazzola et al. (2009) both showed the efficacy of EMDR in improving coping and reducing chronic pain and suffering. In another study, Schneider et al. (2008) applied EMDR in the treatment of five phantom limb sufferers and found that in about 3–15 EMDR sessions, 2 participants were symptom free and 3 experienced a significant decrease of pain, with results maintained at follow-up. De Roos et al. (2010) also studied the effect of EMDR treatment on chronic phantom limb pain using a trauma-focused psychological approach. The treatment processed traumatic memories and pain-related targets using standard EMDR and processed in-session experiences of phantom limb pain using a combination of standard EMDR and Grant's (1999) pain protocol. According to the results, participants showed a significant decrease in chronic phantom limb pain. Four of the 10 participants were considered totally pain free at 3 months follow-up, 4 reported a clinically significant decrease in pain intensity, and 2 did not improve.

Furthermore, Marcus (2008) developed a migraine-specific abortive treatment combining eye movements with diaphragmatic breathing and cranial compression although the full EMDR protocol was not used. Diaphragmatic breathing is used in integrated EMDR (IEMDR) to stimulate the parasympathetic nervous system to initiate the relaxation response. Cranial compression is used to help the migraine sufferer relax certain trigger points around the head and bilateral stimulation (one set of figure-eight pattern slow eye movements to facilitate abortive treatment for migraine). Results of the study showed that cranial compression and basic life support (BLS) were efficient in alleviating the headache for most of the participants, while providing fast return to normal functioning, with no reports of any adverse effects. The data also showed that the positive results were generally maintained over a 7-day period.

Although EMDR seems to be a very promising treatment for MUS and chronic pain, there is no research specific to the treatment of migraine headaches with EMDR, and this pilot study aims to fill the gap in this area.

Method

Purpose of the Study

The purpose of the study was to investigate the effectiveness of EMDR treatment on migraine. In this framework, the three objectives of this study were to investigate the effectiveness of EMDR (a) in reducing the frequency, intensity, and duration of the participants' headache, (b) on medication intake and visits to the hospital emergency room (ER), and (c) in decreasing psychological disturbances.

Design

The study was launched in January 2009 and was completed by September 2009, which included the 3-month follow-up period. Prior to treatment, participants were assessed over a 1-month period of baseline measures. EMDR treatment was then provided for 3 months, with a mean of eight treatment sessions. Follow-up was conducted over a 3-month period. A longer study had originally been planned, but the study ended when the neurologist left the program.

Participants

The study was conducted at Gaziosmanpaşa Hospital in Istanbul, Turkey, with 11 participants who had presented to the neurology department with chronic headache complaints. They all agreed to participate in the study and signed informed consent. The study sample consisted of 9 women with a mean age of 31.7 years ($SD = 10.7$; range = 18–50) and 2 men with a mean age of 30.5 years ($SD = 11.5$; range = 19–42). Participants had a history of migraine ranging from 2 to 30 years with a mean of 12 years. Six of the participants suffered from depressive complaints, 1 from agoraphobia symptoms, and 1 had obsessive thoughts although none were clinically diagnosed to have the aforementioned psychological disorders according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV;* American Psychiatric Association, 2000). Additionally, among the 9 women, 7 had some disabling complaints before and during their menstrual period giving signs of premenstrual syndrome (PMS).

Inclusion and Exclusion Criteria

Inclusion criterion was a referral from the neurologist with a diagnosis of severe migraine (high level of pain, long migraine history, frequent headache attacks). *Exclusion criteria* were serious psychiatric disorders or unstable mental states such as psychosis, major depression with suicide risk, anorexia nervosa, and drug addiction.

Measures

EMDR Headache Treatment Intake Form

This comprehensive intake form was developed by the research team to be used as a semistructured interview during the first session with the patient. It contained thorough questions about life history; health history; relationship history; headache history; current life stressors; traumatic events coinciding with the onset of the headache; other unrelated traumas; and the first, worst, and last headache attacks. Additionally, the form included three items assessing, during the previous 3 months, the number of painkillers used, the number of hospital ER visits, and medication intake for prophylactic treatment.

Structured Clinical Interview for *DSM-IV, Axis I*

The *Structured Clinical Interview for DSM-IV Axis I (SCID-I)* is a semistructured clinical interview administered to diagnose psychiatric disorders according to *DSM-IV*, Axis I disorders (First, Spitzer, Gibbon, & Williams, 1997). The Turkish standardization of SCID-I was carried out by Corapcioglu and his colleagues in 1999. It was used as a screening tool in this study.

Symptom Assessment-45 Questionnaire

The *Symptom Assessment-45 Questionnaire (SA-45)* is derived from the SCL-90 and consists of 45 items (5 items for every subscale); it measures nine psychiatric symptom domains (somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). Additionally, 2 other index scores were included: The General Severity Index (GSI) and the Positive Symptom Total (PST). The items are rated on a 5-point Likert scale ranging from 1 meaning *not at all* to 5, which stands for *extremely* (Strategic Advantage Incorporated [SAI], 2000). The Turkish standardization of SA-45 was done by Epözdemir (2009) and proved to be both valid and reliable for both the nonclinical ($N = 620$) and outpatient ($N = 2{,}481$) adult sample.

Weekly Headache Questionnaire

The Weekly Headache Questionnaire (WHQ), also developed by the research team, included seven sections—one for each day of the week. Participants filled out this form at home every day from the beginning to the end of the study. For each specific day, they rated the frequency, duration, and intensity of their

headaches, their medication intake, and if they had visited the ER. Intensity was rated on an 11-point Likert scale (where 0 = *no headache*, 10 = *the strongest*). Scoring produced two frequency items: the number of weekly headaches and the number of days per week that headaches were experienced. Weekly headache intensity was scored with two items: the mean intensity score and the highest intensity score for that week. Duration of headaches during the week was also assessed with two items: one measuring mean duration of daily headaches and the other measuring duration of the strongest headache.

Test Administration

Prescreening. The pretreatment evaluation was conducted during the 3-week baseline period including psychiatric examination and two treatment intake sessions. First, research assistants administered SA-45 to participants and then they were examined by the psychiatrist with SCID-I for *DSM-IV*, Axis I disorders to screen for exclusion criteria. The WHQ was given to the participants by the research assistants to be filled out at home on a daily basis between sessions. The participants' painkiller intake, the number of the ER visits, and medication intake for prophylactic treatment (in the previous 3-month period) were also evaluated during the intake sessions.

Posttreatment. At the end of the treatment, the SA-45 and the WHQ were administrated, and the participants' medication intake and ER visits were re-evaluated.

Follow-up. During the 3-month follow-up period, every patient was called by the research assistants on a monthly basis to get information about their headache complaints, medication intake, and ER visits. In addition to this, the WHQ was sent at the beginning of each month so that the participants could fill out the forms and send them back.

Treatment

During EMDR treatment, participants continued using pain medication as needed and prophylactic medication as prescribed by their neurologist. No limits were set with regard to the number of EMDR sessions a client would receive. However, because the neurologist left the hospital, the study had to be terminated prematurely, and treatment duration was a total of 4 months. The first month was the baseline assessment period, and during the remaining 3 months, participants received an average of eight sessions of EMDR. Various reasons (e.g., absenteeism, serious headaches) prevented some sessions.

Treatment Planning Phase

The participants were randomly assigned to two clinical psychologists who were experienced and qualified; having completed their EMDR Level II training, they had been applying EMDR in their practice frequently for 3–4 years. The psychologists conducted two intake sessions during the pretreatment screening sessions to get detailed information about the participants and their headache history. Case conceptualization and treatment planning were conducted by the research team in collaboration with the treating psychologist. A treatment execution plan was developed for each participant with three steps: case formulation, sequencing of traumatic events, and identifying triggers. First, the team reviewed assessment reports, interviews, test results, headache characteristics, psychological state, history, and the clinical judgment of the therapist. Second, the team applied the EMDR Headache Protocol (see Table 1) to create a hierarchy of the traumas to work on with EMDR, with the first requiring immediate action. They were ranked in the following order: (a) traumatic events that were clearly connected to headaches, particularly the first experienced/remembered headache attack, (b) recalled traumatic events that took place "relatively close in time" to the first headache attack, and (c) traumatic headache attacks (first, worst, and last). Note that treatment did not specifically address other traumatic experiences that may have been related to the participants' psychological symptoms. Lastly, the team identified the triggers, which were responsible for the maintenance or pushed the onset of the participants' headache.

TABLE 1. The EMDR Headache Protocol

The EMDR Headache Protocol uses standard EMDR procedures and protocols to process the following targets, arranged in this hierarchical order:

1. Traumatic events that are clearly connected to headaches, particularly the first experienced/remembered headache attack
2. Recalled traumatic events that took place "relatively close in time" to the first headache attack
3. Traumatic headache attacks (first, worst, and last)
4. Triggers that are responsible for the maintenance or pushed the onset of the headache
5. Future template based on triggers
6. Other traumas that are not connected to headaches

Note. EMDR = eye movement desensitization and reprocessing.

Treatment Phase

The therapists provided EMDR following the steps of the standard EMDR protocol, targeting the traumatic events in hierarchical sequence, according to the EMDR Headache Protocol (see Table 1). Fifty-minute sessions were held on a weekly basis over a 3-month period. Although all participants processed the traumatic events at the high end of their hierarchy sequence, the early termination of treatment meant that some participants were unable to finish processing the headache triggers.

Treatment Fidelity

As a fidelity check, the research team held weekly meetings to discuss and keep in check the adherence of the treatment to sustain a standard. Furthermore, the weekly supervision of the therapists by a senior EMDR consultant provided a check on the standardization of the applications. For those participants who gave special permission, sessions were videotaped enabling the team and the senior EMDR consultant to observe and inspect each other's sessions.

Data Analysis

Data were collected on a weekly basis during pretreatment, treatment (interval), and follow-up for headache frequency, intensity, and duration; medication use; and ER visits. These data were combined for each variable to create four data points for each individual participant: mean pretreatment, mean interval, mean posttreatment, and mean follow-up. Individual mean scores were then combined to create a composite mean score for all participants. Data analyses were conducted using SPSS version 11.00 for Windows. Because the results of Kolmogorov-Smirnov and Shapiro-Wilk tests for normal distribution yielded a distribution, which was skewed to the right, a series of Friedmann tests were calculated instead of analysis of variances (ANOVAs) for the headache frequency, intensity, duration and medication, and ER visits variables to evaluate the effectiveness of the treatment. Similarly, a series of Wilcoxon Test was performed instead of *t* test to examine the psychological state variable.

Results

Headache Frequency

The application of Friedman's test showed statistically significant changes in the distribution of the number of weekly headaches over the four time points, $\chi^2 = 11.343$, $df = 3$, $p = .01$ (see Figure 1). There were also statistically significant changes in the number of days of pain over the four time points, $\chi^2 = 9.186$, $df = 3$, $p = .027$.

The frequency scores (number of weekly headaches, number of days) reported at pretreatment were significantly higher than scores reported at posttreatment and 3-month follow-up.

An interesting finding was an increase in the number of headaches during the treatment interval, followed by a decrease in frequency at posttreatment. Additionally, treatment effects appear to have been maintained with 3-month follow-up scores similar to those reported at posttreatment.

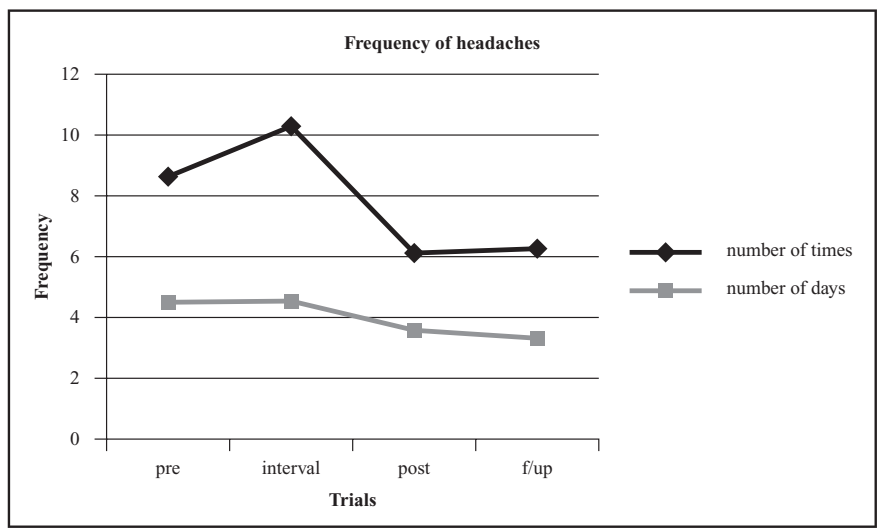

FIGURE 1. Frequency of headaches.

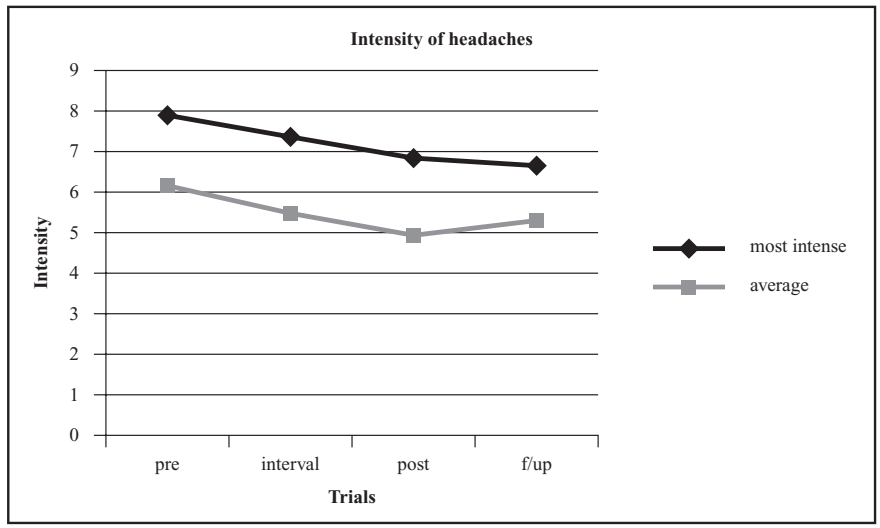

FIGURE 2. Intensity of headaches.

Headache Intensity

Although there was an apparent mild, downward trend in the average intensity of weekly headaches over the four time points, application of Friedman's test shows that this change was not statistically significant, $\chi^2 = 2.306$, $df = 3$, $p = .51$ (see Figure 2). Additionally, there was no change in the rating of the weekly most intense headache, $\chi^2 = 1.515$, $df = 3$, $p = .679$.

Headache Duration

The results of the Friedman's test demonstrated that there was a significant difference between the scores before and after treatment regarding the average duration (hours) of the headaches, $\chi^2 = 7.669$, $df = 3$, $p = .050$ (see Figure 3). However, a comparison of the rating of the duration of the most intense headache was not statistically significant, $\chi^2 = 5.845$, $df = 3$, $p = .119$. On the other hand, when the scores of the duration of most intensive headaches were analyzed without the scores taking during treatment (interval), the results were found to be statistically significant ($p = .016$; $p < .05$), indicating a significant decrease between pretreatment scores and those at posttreatment and follow-up.

Medication and Emergency Room Visits

Results of Friedman's test show that there was a significant difference between the scores before and after the treatment and 3-month follow-up period for both the number of painkillers, $\chi^2 = 8.769$, $df = 2$, $p = .012$, and emergency visits, $\chi^2 = 10.800$, $df = 2$, $p = .005$ (see Table 2).

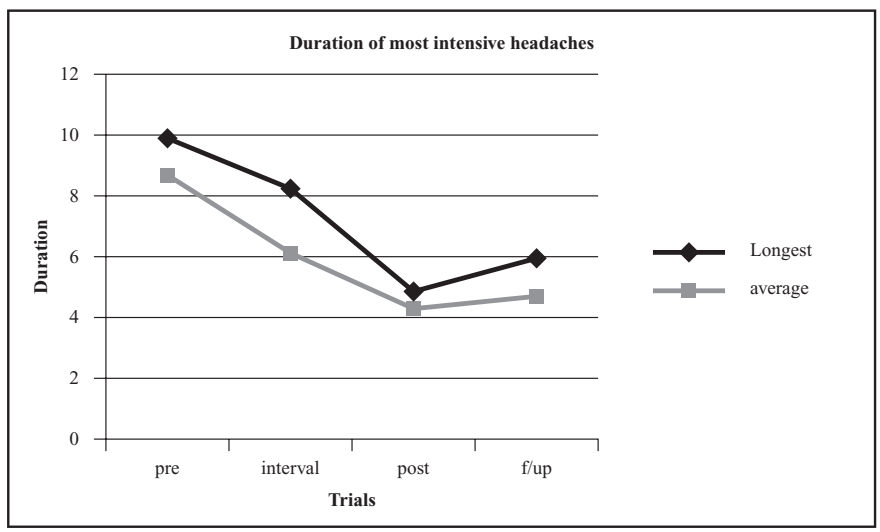

FIGURE 3. Duration of most intensive headache.

TABLE 2. Medication and ER Visit of Patients Over Time

		Painkillers *N*		Visits to ER		Prophylactic Treatment	
	N	Mean	*SD*	Mean	*SD*	Mean	*SD*
Pretest	11	129.36	136.89	2.18	2.99	0.52	0.52
Posttest	11	46.27	61.12	0.27	0.65	0.55	0.55
Follow-up	11	24.00	33.32	0.18	0.40	0.36	0.36
χ^2 (*p*)		8.77*		10.8		1.60	

Note. Friedman's test. ER = emergency room.
*$p < .05$. **$p < .01$.

In terms of the prophylactic treatment, there were some changes in the intake of medication. However, they were not significant statistically, $\chi^2 = 1.600$, $df = 2$, $p = .45$.

Psychological State

Test results on the SA-45 showed that overall, the participants had some moderate psychological distress. There was very little improvement with treatment (see Table 3), and the Wilcoxon test results indicated that there was no significant change in any subscale scores of SA-45 at posttreatment or at follow-up.

Discussion

EMDR is an integrative psychotherapy approach that was originally developed to reduce or eliminate the symptoms resulting from unresolved traumatic memories. EMDR is based on Shapiro's (2001) adaptive information processing model, and it is assumed that psychopathology stems from traumatic memories and related physical sensations, emotions, thoughts, and beliefs. Therefore, presenting symptoms are viewed as resulting from disturbing past experiences that have not been adequately processed and have been encoded in state-specific and dysfunctional form. The core of EMDR involves the transmutation of the dysfunctional experiences into an adaptive resolution that fosters psychological health (Shapiro, 2001; Solomon & Shapiro, 2008).

EMDR has found a wide application beyond PTSD for which it was originally developed for (Shapiro, 2001). A new area of research has been psychosomatic disorders and somatic complaints such as chronic pain, medically unexplained symptoms, and phantom limb pain, and there have been some promising results (van Rood & de Roos, 2009).

The three goals of this study were to investigate the effectiveness of EMDR on (a) the main characteristics of participants' headaches (frequency, intensity, duration), (b) patients' ability to cope with pain shown by medication intake and ER visits, and (c) alterations of migraine patients' psychological state.

Effect of EMDR on Headache Characteristics

The first goal of the study was to assess the effectiveness of EMDR on headache characteristics of frequency,

TABLE 3. Test Results on the Symptom Assessment-45 Questionnaire (SA-45)

		Pretest		Posttest		
Dimensions	*N*	*M*	*SD*	*M*	*SD*	*Z*
Anxiety	10	11.5	4.43	8.5	3.17	1.62
Depression	10	13.6	4.93	11	3.65	1.25
Hostility	10	11.80	5.81	9.9	3.21	0.95
Interpersonal sensitivity	10	9.90	4.09	8.5	3.37	1.02
Obsessive–compulsive	10	14.3	5.40	11.7	2.54	1.54
Paranoid ideation	10	10.5	5.19	9.6	4.42	0.89
Phobic anxiety	10	8.10	3.54	6.50	1.90	1.27
Psychoticism	10	8.3	3.23	6.30	1.34	1.84
Somatization	10	14.90	5.30	12.9	3.38	1.43

Note. Comparisons conducted using Wilcoxon Signed Ranks Test were not significant.

intensity, and duration. The results showed that following EMDR treatment, there was a significant decrease in headache frequency and duration, although there was no significant change in pain intensity. The findings of this study are important because they show a significant reduction in headache frequency and duration with the treatment of the distressing memories related to the migraine headache.

As mentioned previously, preliminary studies indicate that EMDR may be effective as an alternative treatment of somatic complaints such as medically unexplained symptoms, phantom limb pain, and chronic pain (e.g., de Roos et al., 2010; Grant & Threlfo, 2002; Mazzola et al., 2009; Schneider et al., 2007, 2008). In this sense, the results of this study are consistent with those of other studies. For instance, when the studies investigating the effects of EMDR on mixed group of chronic pain participants and phantom limb pain patients are compared, the results show that the pain intensity decreased more for phantom limb pain patients than for chronic pain patients with regard to the difference on the primary tasks (van Rood & de Roos, 2009). So, whereas the traumatic memories stemming from losing a limb were the main target in EMDR work with phantom limb pain patients, the actual pain sensations were the primary targets for the chronic pain patients in Mazzola et al.'s (2009) study. In this study, the target was the traumatic or disturbing memories associated with the headache.

It is noteworthy that frequency of headaches increased during the treatment period in this study. This increase may be related to working with traumas originally connected with the headaches, resulting in an increase in stress or anxiety during treatment. This increase in frequency declined at posttreatment, with a significant improvement maintained at follow-up. Further research is needed to investigate the course and role of headache frequency and how this is manifested during EMDR treatment of headache pain.

Headache intensity did not show any significant decrease with treatment. Perhaps this is a function of early termination of treatment for some participants who did not have the opportunity to process the triggers relating to the onset or context of their headache. Further research is needed to investigate this and to look at the course and association of the headache components (frequency, duration, intensity) during EMDR treatment.

Effect of EMDR on Medication Intake and Emergency Room Visits

The second goal of the study was to assess the effectiveness of EMDR on medication intake and ER visits. The results showed that the number of painkillers and the number of ER visits dropped significantly after the treatment, and it continued during the 3-month follow-up period. These outcomes provide some preliminary evidence for the effectiveness of EMDR because they suggest that with the decrease in headache frequency and duration, participants were able to cope with them without as much medical intervention. This is consistent with the results of other research showing the efficacy of EMDR in improving patients' coping mechanisms and reducing chronic pain and suffering (e.g., Grant & Threlfo, 2002). In one study conducted by Mazzola et al. (2009), a larger sample size ($N = 38$) was used to explore the effectiveness of EMDR in the treatment of chronic pain, and it was reported that parallel to a general decrease in pain, there also was a significant reduction in medication intake. Despite the significant decrease of the number of the painkillers and ER visits, the same decrease did not apply for patients' medication intake for prophylactic treatment.

Effect of EMDR on Psychological State

The SA-45 Questionnaire, which has consistently yielded significant findings for the relationship between psychiatric disorders (particularly mood disorders and anxiety disorders) and primary headaches (Breslau & Davis, 1992; Merikangas, Merikangas, & Angst, 1993; Sheftell & Atlas, 2002), was used to assess the psychological symptoms of participants before and after the treatment as a third goal of the study.

The analysis shows that although the scores of all subscales of SA-45 decreased in the posttreatment, these differences were not statistically significant. It is important to note that this study did not target the specific traumatic experiences that may have been related to the patients' psychiatric disorders or psychological symptoms. The only treatment targets in this study were the traumatic/disturbing memories and triggers associated with the patients' headache. Also, it should be noted that there may have been an effect from the early termination of treatment. To systematically evaluate this finding, future research on migraine headaches should compare the effects of treating only headache-related memories to treating memories of all disturbing life incidents.

Conclusion

Overall, the results of this study show that both the frequency and the duration of the patients' headache attacks decreased significantly along with their painkiller intake and visits to the ER. This result may very well indicate that patients did not experience headaches as they had done before, and they were also able to devise better coping strategies compared to pretreatment. Finally, the study demonstrates the effectiveness of the

EMDR headache treatment, which means it may be an efficient alternative treatment for migraine and chronic daily headaches.

Although EMDR seems to be a promising treatment for medically unexplained symptoms and chronic pain, this pilot study is the first research to specifically investigate the treatment of migraine headaches with EMDR. However, there were some limitations with the research design: (a) lack of a control group and trauma-symptom specific measures, (b) small sample size, (c) restricted number of sessions, and (d) nonrandom selection of the patients. Furthermore, the premature termination of the study can be interpreted as an inherent weakness. Further studies can overcome certain limitations by using a larger sample size along with randomized clinical trials.

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