

## The effect of eye movement desensitization and reprocessing on phantom limb pain in patients with amputation

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**Abstract:** It has been estimated that more than 50% of patients suffer from phantom limb pain after amputation. Present study was conducted to identify efficacy of eye movement desensitization and reprocessing on the phantom limb pain of patients with amputation. **Materials and Methods:** present study is semi-experimental in nature. 20 patients with amputation suffered from phantom limb pain and were under pharmacological therapy for long time selected by available sampling (2012-2013). EMDR method applied for each patient individually at consultation room of BU-ALI SINA hospital during six sessions per one hour for nine weeks. In each session, Numeric Rating Scale completed by the patients before and after intervention. In order to collect data, demographic and Numeric Rating Scale (NRS) questionnaire were used. Data gathered during six therapeutic sessions were analyzed by using SPSS 16 software as well as the descriptive statistics and the statistical tests including paired - t-test, Chi square. **Results:** Mean phantom limb pain in 20 patients was  $7.95 \pm 1.63$  before intervention and it was  $2.25 \pm 1.25$  after intervention, which using with paired T test showed an statistically significant difference ( $p < 0.001$ ). **Conclusion:** The eye movement desensitization and reprocessing is effective, useful and non-invasive method for treatment and reducing phantom limb pain in patients with amputation.

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**Key words:** phantom limb pain, eye movement desensitization and reprocessing, amputation

### Introduction

It has been estimated that as many as 80% of those undergoing amputations experience phantom limb sensations[1]. Unfortunately, it has been estimated that more than 50% of patients suffer from phantom limb pain after amputation with pain often described as excruciating and chronic[2]. Annually about 200-500 million amputations occurring around world because of disease, trauma and congenital defects which approximately 85% are in limbs. For those with amputation the phantom limb pain is a serious problem and causes the therapeutic challenges for who need therapy. Physical and mental constraints can cause by phantom limb pain. In some studies, phantom limb pain has been reported 59-79% [3]. Non psychological treatments for phantom pain traditionally include local anesthesia, sympathectomy, dorsal root lesions, cordotomy, neurostimulation, and various pharmacological interventions[4]. However, even the maximum consistent benefit produced with these patients is reported to be unsatisfactory and transient in most cases, and in some studies not even better than the placebo control at long-term follow-up[5]. Many treatments to date have shown little benefit in pain

reduction, particularly pharmacological treatments and invasive treatments involving surgery. Physical, psychological and behavioural treatments that replace or substitute the absent afferent signals from the amputated limb show the greatest promise for reducing phantom pain[6]. cognitive behavioral therapy (CBT) is effective in reducing pain, eye movement desensitization and reprocessing (EMDR) is superior. Specifically, CBT introduces techniques to allow the patients to alter their thoughts or physical reactions to the pain sensations, while EMDR treatment “not only works through cognitions ,but also seems to have a direct effect on desensitizing the limbically augmented portion of the pain experience[7]. EMDR adds a dimension Painful conditions, such as PLP, may be the result of inappropriately stored or chronically activated pain memories that continue to disturb the subject even after the disease or injury has been successfully treated. These memories are a major factor in the maintenance of PLP, and disengagement of such memories may have a lasting effect on PLP. Methods that are potent in processing traumatic memories might also be effective in reducing the affective dimensions of pain memories to a situation

appropriate level. An intervention specifically aimed at processing unresolved memories of negative experiences is eye movement desensitization and reprocessing (EMDR), an evidence based treatment for traumatically induced memories. Small case series have indicated that EMDR is effective in the treatment The PLP[8]. Five consecutive cases of phantom limb pain were treated with EMDR. The time since the amputation ranged from one week to three years. Four of the five clients completed the prescribed treatment and reported that pain was completely eliminated, or reduced to a negligible level. The one client who stopped treatment chose to do so after reducing his pain by one half[9]. EMDR is expected to alter the patient's cognitive, affective and somatic symptoms and enable the patient to identify inner resources that can provide pain relief[10]. Present study was conducted to identify efficacy of eye movement desensitization and reprocessing on the phantom limb pain of patients with amputation

### Materials & Methods

Present study is semi-experimental in nature. 20 patients with amputation suffered from phantom limb pain and were under pharmacological therapy for long time selected by available sampling (2012-2013) and studied. Inclusion criteria were a history of at least 9 months PLP, severe disabling pain for at least four days per week. Participants were excluded from the study if a psychiatric disorder was diagnosed for which immediate treatment was necessary (eg, psychosis, dissociative disorder or risk of suicide). Medical Exclusion criteria ( related to possible complications during the EMDR process) were epilepsy, pregnancy and any prior history of mental retardation, substance abuse, or systemic disease affecting the central nervous system. Participants were asked to refrain from using any other treatment for PLP for the duration of the study. for gathering the data four scales used. Subjective Units of Disturbance (SUDS) is a 0-to-10 scale where 0 signifies lack of any distress and 10 represents the highest imaginable. Validity of Cognition Scale (VOC) is a 1-to-7 Likert type scale where represents an adaptive cognition that one is completely unbelievable and a 7 represents that is totally believable. Numeric Rating Scale (NRS) is a self-report rating of pain intensity using a 0-to-10 scale where 0 signifies no pain and 10 represents the worst pain possible[11]. Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) is a 21-item self-report of depressive symptoms with scores ranging from 0 to 63[12]. EMDR method applied for each patient individually at consultation room of BU-ALI SINA hospital during six sessions per one hour for nine weeks. In each session,

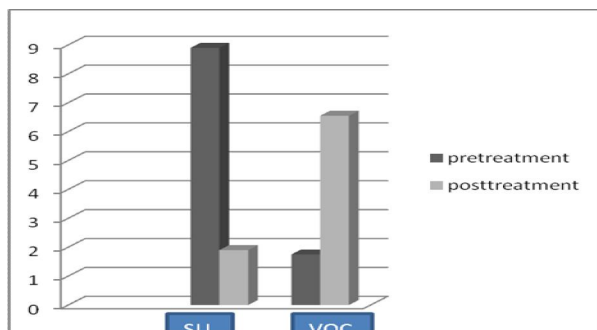
mentioned scales completed by the patients before and after intervention. Data gathered during six therapeutic sessions were analyzed by using SPSS 16 software as well as the descriptive statistics and the statistical tests including paired - t-test, Chi square. All participants provided written informed consent. authors started data gathering process after getting permission from ethic committee of Qazvin University of Medical Sciences with registration No. of 28.20.6190. There was no obligation for the samples to participate in this study and they were ensured about confidentiality of their all information.

### Description of EMDR Treatment

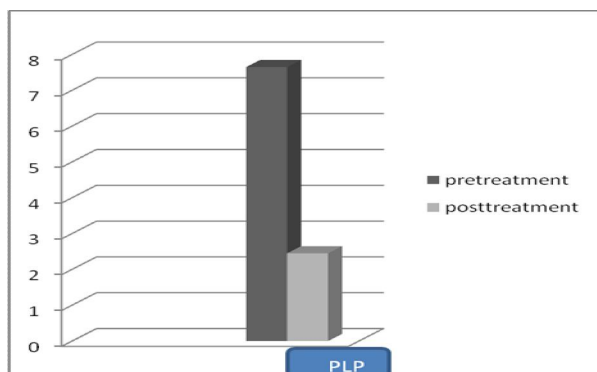
The primary goal of EMDR treatment is to gain access and process stored memories by means of a set of standardized procedures, which include repetitive eye movements, auditory signals, or tactile stimulation. EMDR is an integrative psychotherapy approach consisting of eight phases and specific protocols used to address the presenting complaints. The first phase is Client History, evaluating the entire clinical picture to identify the experiences that will need to be processed to both eliminate the dysfunctional cognitive, emotional, somatic, and behavioral elements and incorporate the positive experiences necessary for a successful future. The Preparation Phase educates the client about the symptom picture and teaches a range of metaphors and self control techniques to assist stabilization and facilitate processing. The Assessment Phase accesses the target memory and identifies the image, currently held negative belief, emotion, and physical sensations attendant to the disturbing experience. It also specifies the current rating of distress, using the 0–10 (0 = neutral to 10 = the worst disturbance imaginable) Subjective Units of Disturbance (SUD) scale, and strength of the desired positive belief, using the 1–7 (1 = completely false to 7 = completely true) Validity of Cognition scale (VOC). The reprocessing phases (Desensitization, Installation, and Body Scan) utilize standardized procedures, which include bilateral stimulation (e.g., eye movement, taps, tones) to process the target. During the reprocessing phases, an association process is encouraged, which elicits other experiences contributing to the dysfunction, along with insights and shifts in affective and somatic manifestation. The Closure and Reevaluation phases return the client to equilibrium, self-monitor mid session distress, and ensure that positive treatment effects have been maintained. The present study tested the effectiveness of EMDR in the treatment of PLP [ 7].

## Results

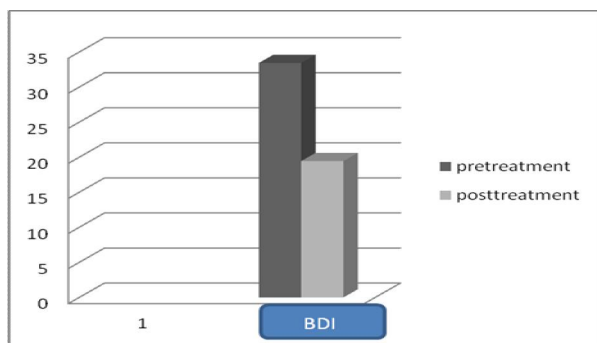
Understudy patients were in age range 34-59 years old. From 20 patients studied, 70 % (14 persons) were male and 30 % (6 persons) female. Diabetes (45%), accidents (30%) and cancer(25%) were reasons of the amputation. location of the amputation in 60 % (12) was under knee and in 40 % (8) above knee. Mean phantom limb pain in 20 patients was  $7.95 \pm 1.63$  before intervention and it was  $2.25 \pm 1.25$  after intervention, which using with paired T test showed an statistically significant difference ( $p < 0.001$ ).



**Figure 1:** Pre-post Treatment Subjective Units of Disturbance, Validity of Cognition Scale



**Figure 2:** Pre-post Numeric Rating Scale (NRS)



**Figure 3:** Pre- and post treatment changes on the Beck Depression Inventory

## Discussion

The usefulness of EMDR has been demonstrated in these 20 cases of chronic phantom limb pain. EMDR was also used to address his PTSD and depression symptoms. According to the AIP model, both the emotional components of pain and the pure pain sensations should be conceptualized as memories that have been dysfunctionally stored and that may therefore be processed to resolution. As noted by Shapiro, this model may help to explain why phantom limb pain can some times be prevented by administering epidural agents prior to amputation and sometimes not prevented. That is, if the pain is directly related to the experience of surgical amputation, such procedures may effectively reduce subsequent phantom limb pain[7]. Phantom pain is recognized to be an interaction of physical and psychological factors. Importantly, emotion can be a central factor in the production and maintenance of pain. EMDR appears particularly well suited to the processing of physiologically encoded memories, a processing that in turn leads to a decrease or elimination of the pain sensation. The AIP model guiding the EMDR treatment posits that, in addition to the emotional components, the pain sensations should be viewed as physiologically encoded somatic memories that have been dysfunctionally stored and may be processed to resolution[13]. The usefulness of EMDR has been demonstrated in application to five cases of phantom limb pain. In all cases, reprocessing of targeted memories resulted in a reduction of pain (with two cases of complete elimination), maintained at follow up ranging from 14 months to two years[12]. Case reports involving the use of Eye Movement Desensitization and Reprocessing (EMDR) have indicated that this may be another effective, noninvasive PLP treatment option. The first published case of phantom limb pain EMDR treatment involved a Colombian adolescent whose leg pain was completely eliminated by focusing on her traumatic experience and pain sensations; positive results were maintained at a two year follow up (Shapiro & Forrest, 1997). In treating ten amputees with phantom limb pain, Wilson, Tinker, Becker, Hofmann & Cole (2000) reported that seven of the ten experienced no pain following the use of EMDR[9]. The results Case series of five patients with phantom limb pain shows that a significant decrease or elimination of phantom pain [7]. In a case study of EMDR treatment for severe phantom limb pain following amputation, the phantom limb pain was completely ablated after nine sessions, with the results maintained at 18-month follow-up (Schneider, Hofmann, Rost, & Shapiro, 2007). In another case, presented by Russell (2008),

only four sessions of EMDR treatment led to elimination of phantom limb pain[14].

### Conclusion

The usefulness of EMDR has been investigated in the treatment of 20 patients suffering phantom limb pain during 6 sessions over a 9-week period. In the present study, we found a general decrease in phantom limb pain. This research offers EMDR as a potentially important treatment for a condition typically considered substantially intractable. The remediation of suffering supports conjectures regarding EMDR's potential effects with chronic pain patients and, consistent with the AIP model[15], indicates that the processing of etiological experiences and issues of self efficacy can result in the complete and long lasting cessation of previously unremitting phantom limb pain without the need for additional self monitoring, continued reinforcement, as well as the reduced use of the medical system and medications[13]. Limitations of the present study include the absence of a control group and the lack of a follow-up, which we acknowledge is an important issue. Other limitations include homogeneity with respect to gender (14 men and 6 women). We hope our results will encourage further research of EMDR in the treatment of phantom limb pain. Our results suggest that this psychotherapeutic approach has the potential to be a useful intervention for the treatment of chronic pain patients.

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