

## **Effectiveness of Cognitive Behavioural Therapy and Eye Movement Desensitization and Reprocessing Among Iranian Children With Post Traumatic Stress Disorder**

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### **ABSTRACT**

The present study aimed to compare the effectiveness of Cognitive-Behavioral Therapy (CBT) and Eye Movement Desensitization and Reprocessing (EMDR) in reducing PTSD symptoms severity among Iranian children 20 months after the 2008 Qeshm earthquake. This study follows an experimental design with randomized pre-test post-test to control the internal and external validity of the study. In this study, 26 students from 7 to 12 years old who received PTSD diagnosis due to earthquake based on the clinical interview were randomly assigned to CBT, EMDR, and wait-list control groups. All the participants completed UCLA-PTSD DSM-IV Index as pre-test and post-test. The respondents in the treatment groups were also required to complete The Youth Client Satisfaction Questionnaire (YCSQ). According to the results of ANCOVA, after participating in 8-12 sessions of psychotherapy, the participants of CBT and EMDR groups showed a significant reduction in overall PTSD symptoms compared to the wait-list group between the pre and the post-intervention. Although in comparison to EMDR, CBT was more effective in reduction of PTSD symptoms, the difference was not statistically significant. Post-treatment therapeutic outcomes were maintained during six weeks follow-up; however, the effects of EMDR were improved during this period. The results also showed no significant difference between the respondents' satisfaction from CBT and EMDR. Both CBT and EMDR appeared to be feasible and acceptable to PTSD children survived from natural disasters.

**Key Words:** Earthquake, Posttraumatic Stress Disorder (PTSD), Cognitive -Behavioral Treatment (CBT), Eye movement Desensitization and Reprocessing (EMDR)

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**Practitioner point****CBT - EMDR efficacy -pediatric PTSD****Limitation: small sample size, Lack of comorbidity*****Background***

Natural disasters, both expected and unexpected, usually cause widespread injuries and destruction with a large number of survivors, including children.

Several studies have shown that children may develop Post Traumatic Stress Disorder (PTSD) after exposure to earthquake (Eksi, Braun, Ertem-Vehid, Peykerli, Saydam, Toparlak, & Alyanak, 2007; Yassini & Hosseini, 2006., Roussos, Goenjian, Steinberg, Sotiropoulou, Kakai, Kabakos, ...& Manouras 2005 ).

Some researchers have reported that Cognitive-Behavioral Therapy (CBT) has been the most studied treatment for childhood PTSD following a single incident trauma (Amaya-Jackson, Reynolds, Murray, Nelson, Cherney, Lee, Foa, March, 2003; Goenjian, Layne, Pynoos, Saltzman, Arslanagic, Black, Savajak, 2001; Saltzman, Layne, Pynoos, Steinberg, Aisenberg, 2001). Kar (2009) has shown the effectiveness CBT in treating PTSD symptoms related to catastrophic events in children and adolescents. Moreover, a meta-analysis conducted by Kar (2011) has shown the effectiveness of CBT in treating PTSD symptoms related to catastrophic disasters in children and adolescents and suggested that CBT can be regarded as the established treatment of PTSD in these age groups.

The American Psychiatric Association (2008) has stated that Eye Movement Desensitization and Reprocessing (EMDR) may be useful for the people who have trouble talking about the traumatic events they have experienced (WebMD.com). Although this may be useful for children, the clinical use of EMDR in treatment of PTSD symptoms in the children has not been evaluated through experimental studies. An appropriate assessment of the clinical use of EMDR in treatment of childhood PTSD can be accomplished by a comparison with a validated intervention, such as CBT.

Seidler and Wagner (2006) conducted a meta-analysis in order to compare the efficacy of EMDR and trauma-focused CBT in treatment of PTSD. Based on the results of seven studies, they suggested that trauma-focused CBT and EMDR tend to be equally efficacious and superiority of one treatment over the other could not be demonstrated.

Rodenurg, Benjamin, Roos, Meijer, and Geert (2009) evaluated the efficacy of EMDR in the children with PTSD in an article review. The results demonstrated that EMDR had medium to large effect size in remission of pediatric PTSD compared to the control group and showed an incremental effect size in comparison to a well validated treatment like CBT. Recently, the small number of original studies directly comparing EMDR and trauma-focused CBT in a pre/post design makes it difficult to precisely evaluate these therapeutic modalities in treatment of pediatric PTSD and, consequently, the superiority of one over another is open to debate.

#### ***Aims of the study***

This study aimed to determine the effectiveness of two psychological treatment approaches, namely CBT and EMDR, among Iranian children diagnosed as suffering from PTSD. These children were exposed to an earthquake in Qeshm, Iran in 2008. It is hypothesized that the children who participated in CBT and EMDR groups show more reduction in PTSD symptoms severity compared to the wait-list control group between the pre-test and the post-test. In addition, the participants of the CBT group are more satisfied with the therapy at the post-test compared to the EMDR group.

#### ***Research Design***

The present study was conducted using a randomized pre-test, post-test, control group design. Specifically, the study incorporated random assignment of the participants into treatment and control groups with pre-test, post-test, and follow-up measurements.

We compared the severity of PTSD symptoms at the pre-test and the post-test among the participants in CBT, EMDR, and wait-list control groups. It should be mentioned that the participants of the wait-list control group received treatment after the study period was over.

#### ***Method***

##### ***Participants***

The study participants consisted of 26 children aging between 7 and 12 years old who were diagnosed as PTSD. The samples were selected from all the 311 students of the two elementary schools in the villages of Zeinabieh and Gorbahan, 35 km west of Qeshm Island in southern Iran. Those villages were hit by a 6.1-magnitude quake on September 10, 2008. The mean age of the children was ( $M= 9.80$ ,  $SD =1.57$ ) and they were divided into three groups randomly.

### **Materials**

*University of California at Los Angeles Posttraumatic Stress (UCLA PTSD) Index* for DSM-IV developed by Rodriguez, Steinberg, and Pynoos (1999) is a revision of the UCLA PTSD Reaction Index (UCLA PTSD-RI) developed by Pynoos, Rodriguez, Steinberg, Stuber, and Frederick (1998). It consists of a child and parent version. This instrument assesses the reactions to trauma in children and adolescents. The items of the UCLA PTSD Index for DSM-IV are matched to the DSM-IV criteria and can provide initial PTSD diagnostic information. The scale's reported Cronbach's  $\alpha$  is 0.90 and the test re-test reliability over the different versions ranges from good to excellent. Roussos et al. (2005) reported a test-retest reliability coefficient of 0.84 for the DSM-IV version. Moreover, its convergent validity was 0.82 in comparison to the Child and Adolescent Version of the Clinician-administered PTSD Scale. It was translated into Persian via the back-translation technique. After validation from five experts, the reliability of this instrument was tested through a pilot study among 30 students. The Cronbach  $\alpha$  was .86 for overall items.

### **Structured clinical interview (SCI)**

A psychiatrist conducted the structured clinical interview (SCI) with the children and parents (SCI) based on DSM-IV-TR (2000) criteria for PTSD diagnosis.

### **The Youth Client Satisfaction Questionnaire (YCSQ)**

*The Youth Client Satisfaction Questionnaire (YCSQ)* is a 4-point, Likert-type scale for measuring the young clients' satisfaction from mental health services. Shapiro, Welker, and Jacobson (1997) reported a test-re-test reliability coefficient of .92 and Cronbach's  $\alpha$  of .90 for the YCSQ. In order to standardization of the instrument it was translated into Persian via back-translation technique. Later the contents were checked with 10 children aged 7 to 12 who were referred to the Ebn-e-Sina psychiatric hospital of Bandar Abbas city.

Thirteen items from the original questionnaire were considered as comprehensible for this age group. However one item (Did counseling change the way you feel about yourself?) was not retained because the children in the focus group did not understand it. After validation from five experts, the reliability of this instrument was tested through a pilot study. The instrument was administered to 30 children between the ages of 7 to 12 who were referred to the Ebn-e-Sina inpatient clinic and also

to a consulting center under the authority of Bonyad-Shahid Organization. The respondents in this pilot study were children who terminated their counseling or psychotherapy after at least 3 sessions. The Cronbach  $\alpha$  was .71 for overall items.

### **Procedure**

We began the initial screening among all 311 students in the two elementary schools of Zeinabieh and Gorbadaan villages by questioning about their reaction to the earthquake and their current symptoms. Out of 50 children was selected in this initial screening.

Then, we briefly interviewed the parents of the potential respondents with regard to the possibility of the occurrence of PTSD symptoms and the appropriateness of their children to participate in the study. Thereafter, with their parents' consent, we asked the children to respond to the UCLA PTSD Index for DSM-IV (Child version-Part A). The parents also answered the Parent Version (Part A) of the questionnaire in order to rule out other forms of significant traumatic experiences after the earthquake (exclusion criteria).

The parents and the children who did not report any other significant traumatic experiences were also requested to respond to the UCLA PTSD Index for DSM-IV Parent & Child version-Part B, respectively. Furthermore, a diagnostic interview based on the DSM-IV-TR structured interview was conducted by a psychiatrist to further identify the children who had met the initial criteria. Out of 28 eligible children who were selected based on the inclusion and exclusion criteria of the study, two did not participate in the study since their parents were not willing to. Therefore, the sample size was limited to 26 children in this study.

In order to check if this sample size has enough power we calculate sample size, However, due to the lack of epidemiological data about the incidence of PTSD among Iranian children, data from a recent research about the effect of CBT treatment on PTSD children 4 months after Bam earthquake conducted by Hakim Shooshtary et al. (2008) was used. With the test power set at 90% and  $\alpha = .05$ , the minimum number of subjects in each group were calculated to be about eight persons. The calculation for sample size is presented below based on the Senedecor and Cochran's formula (1989).

$$n = \frac{(z_{\alpha/2} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\mu_1 - \mu_2)^2}$$

$$n = \frac{(1.96 + .84)^2 (1.80^2 + 2.02^2)}{(4.48 - 7.18)^2} = 7.87$$

$$\alpha = .05$$

$$z \frac{\alpha}{2} = 1.96$$

$$\beta = .1$$

$$z_{1-\beta} = .84$$

Then participants were assigned to either the CBT or EMDR treatment groups or the wait-list control group randomly. We conducted one 60 minute intake interview with the children and their parents and concluded that individual psychotherapy had to be performed in at most 12 sessions for both groups. Participants in Wait-list group waited for 19 weeks and then received twelve 60-minute sessions of CBT treatment. The UCLA PTSD Index for DSM-IV (Part C) was administered by an independent blind evaluator at the post-test and again at the follow-up.

#### ***Treatments protocol***

In this study, the principal investigator was the therapist or treatment provider for both the CBT and EMDR experimental groups. She has received Level 1 training in EMDR and has had prior experience in the use of cognitive-behavioral therapy and also in psychotherapy with children.

We derived the CBT protocol developed by Dygerov (2002) from the Psychological Support in Disasters Manual prepared by UNICEF. This protocol was modified by Alizadegan, Yasamy, Esmaelii, Gudarzi, Mohsenifar, and Shams (2005) to be used in Iran and published by the Mental Health office of Iran's Ministry of Health and Medical Education. It was used in a group format for the pediatric survivors of the 2004 Bam earthquake. In this study, we used the techniques was used to modified intrusion, avoidance and hyperaroural symptoms. In addition, we applied the generic protocol of CBT treatment for the children with PTSD (Tylor, 2006) to organize and define the components of this maximum 12 week treatment. At the end of each treatment session, we requested the children to do some related homework which was reviewed at the beginning of the next session. In this study, the course of the CBT treatment consisted of seven phases (See Table 1).

**Table 1 CBT treatment course**


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<b>Phase 1:</b> Intake Assessment and Case Formulation with Child and Parent
<b>Phase 2:</b> Planning Treatment, Normalization and Differentiation Between Four Channels Nodes
<b>Phase 3:</b> Use Emotional Regulation Techniques to Modify Hyperarousal Symptoms (Controlled breathing, safe place instruction, distraction and deep muscle relaxation as well as sleep hygiene).
<b>Phase 4:</b> Cognitive Restructuring, Positive Self Statement, Thought Stopping.
<b>Phase 5:</b> Use Techniques to Modify Intrusion Symptoms (screen technique (imagine the intruding image as if on a TV screen ), framing (put a frame around the image), hand and distance technique (to imagine that the intruding image is on the therapist's palm and then the image disappeared), positive counter images (to imagine a positive image), locking away the image (the image is framed and then hidden ), and imaginary helpers ( used to change the content, the action and the outcome of the image), and thought-stopping.
<b>Phase 6:</b> Use Techniques to Modify Avoidance Symptoms (talking about reminders and behavioral avoidance, making hierarchy of traumatic reminders, identifying good and bad avoidance, imaginal and in-vivo exposure, drawing, writing, and talking.
<b>Phase 7:</b> Social skills Training as on and as-needed Basis.

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The EMDR protocol in this study was derived from the Treatment Manual of EMDR and the Art of Psychotherapy with Children developed by Robbie – Adler, Tapia Carolyn Settle (2008). The EMDR protocol consists of eight phases. Unlike CBT, the phases in EMDR may consist of less than one session. At the beginning of each session, the therapist reviews the previous session and answers any question from the child in addition to assessing the child's general functioning since the previous session. The first three sessions are almost similar to CBT treatment. Treatments were provided in the Health House or clinic located in both villages.

#### ***Data analysis***

Preliminary data analysis showed that the participants of all the three groups were homogeneous regarding age, gender, and location. The severity of PTSD symptoms was assessed in the beginning and the end of the interventions using UCLA PTSD INDEX for DSM-IV (Child Version) scores. The participants' scores in the pre-test were used as the covariate factor in this analysis. In order to investigate this hypothesis, One-Way Analysis of Covariance (ANCOVA) was utilized. Homogeneity of the regression slopes was examined before performing the ANCOVA. Nevertheless, if this assumption was not met, ANCOVA did not have to be conducted (Pallant, 2001). In fact, homogeneity was

the next assumption which was examined through Levenes' test of equality to make sure that there was no significant difference among the three groups regarding the mean scores of the dependent variable and the confounding variable.

### **Results**

In this study, ANCOVA was performed in order to determine whether the reductions in means were large enough to be considered significant and examine the main effect of the intervention. The results showed significant differences among the groups regarding the overall PTSD symptoms severity scores,  $F(2, 22) = 19.62, P = .001 (P < .05)$ . In addition, the magnitude of the effect size (partial eta square) for the group variable was  $(\eta^2) = 0.64$  which, according to Cohen's criteria (1988), is a large effect size (See Table 2).

**Table 2 Analysis of covariance tests for overall PTSD severity scores by group**

Source	SS	df	Ms	F	Sig.p	$\eta^2$
Pre-test	190.54	1	190.54	3.23	.08	.12
Group	2390.35	2	1156.17	19.62	.001 *	.64
Error	1295.89	23	58.90			
Total	20988.00	26				

Note: \*Sig.p < .05

The follow-up tests were used to evaluate the pairwise differences among the adjusted means for the treatment variable.

The children who participated in the CBT and EMDR treatment groups showed significantly more reduction in PTSD symptoms severity scores between the pre-test and the post-test compared to the wait-list group (see Table 3).



**Table 3 Pairwise comparisons among the three groups for overall PTSD severity scores**

Group I	J	Mean Differences (I-J)	Sig.p
CBT (M=15.76) (SD=4.36)	EMDR (M=23.37) (SD=11.11)	-7.61	.06
CBT (M=15.76) (SD=4.36)	Wait-list (M=39) (SD=7.03)	-23.21	.001*
EMDR (M=23.37) (SD=11.11)	Wait-list (M=39) (SD=7.03)	-15.60	.001*

Note: \*p<.05

In order to examine whether the therapeutic outcomes at the post-test were maintained at six weeks follow-up, one-way analysis of variance was run among the groups. The therapeutic outcomes were assessed using the overall PTSD scores obtained from the UCLA PTSD INDEX for DSM-IV (Child Version) administration at 6 weeks follow-up (See Table 4).

**Table 4 Descriptive statistics for overall PTSD severity scores at follow-up**

Groups	N	Mean	SD
CBT	9	14.22	8.77
EMDR	9	22.66	10.00
Wait-list	8	40.50*	8.73*
Total	26	25.23	14.09

The study results showed significant differences between the 3 groups regarding the mean scores,  $F(2, 23) = 17.78$ ,  $P = .02$  ( $P < .05$ ). The magnitude of the effect size for the group variable was  $(\eta^2) = .60$ . Post-hoc Tukey HSD test comparisons showed significant differences between the treatment groups compared to the wait-list group. However, no significant difference was found between CBT and EMDR groups. Furthermore, a reduction was observed in the mean value of PTSD symptoms in the EMDR group at the follow-up. This means that the PTSD symptoms had improved among the respondents in the EMDR group at the follow-up. Despite the fact that EMDR respondents showed

more improvement, the differences between the groups were maintained during the six weeks follow-up.

Based on the UCLA PTSD INDEX FOR DSM-IV requirements (derived from DSM-IV) in which full PTSD diagnosis requires at least one necessary symptom in B criterion (intrusion), at least three necessary symptoms in C criterion (avoidance), and at least 2 necessary symptoms in D criterion (arousal), a diagnostic threshold was drawn up for this study. The participants were considered as no longer meeting the PTSD symptoms criteria if: 1) they lacked one of the necessary criterion B symptoms (intrusion), 2) and/or three of the necessary criterion C symptoms (avoidance/numbing), 3) and /or two of the necessary criterion D symptoms (arousal). However, if they had one necessary criterion B symptom, three necessary criterion C symptoms, and 2 necessary criterion D symptoms, they were considered as continuing to meet the PTSD symptoms criteria. Based on these diagnostic thresholds, Chi-square test was run in order to compare the study groups regarding the proportion of the participants who no longer met the full PTSD symptoms criteria at the post-test. The results of cross-tabulation analysis revealed significant differences (Pearson  $\chi^2$  (2, 23) = 6.36,  $P = .04$  ( $P > .05$ )) among the three groups with respect to the proportion of the participants who no longer met the full PTSD symptoms criteria based on the diagnostic threshold. The magnitude of the effect size was ( $\chi^2$ ) = .42 which is a medium effect size according to Cohen's criteria (See Table 5).

**Table 5 Chi-square test for meeting PTSD symptoms criteria by groups at post-test**

Group	Met symptoms criteria N	No longer met symptoms criteria N	df	Pearson ( $\chi^2$ )	Sig.p	( $\eta^2$ )
CBT	4(44.4%)	5 (55.6%)	2, 23	6.36	.042	.46
EMDR	5(55.6%)	4(44.4%)				
Control	8 (100%)	0(0%)				
Total	17(65.4%)	9 (34.6%)				

Finally, the results of Chi-square test revealed no significant difference between CBT and EMDR groups concerning the proportion of the participants who no longer met the full PTSD symptoms criteria ( $\chi^2 (2, 18) = .22 P > .05$ ).

### ***Respondents' satisfaction with therapies***

In order to compare the participants' satisfaction with the therapies they received, scores obtained from administration of youth client satisfaction questionnaire (YCSQ) at post-test were analyzed through an independent-sample t-test. The results indicated no significant difference between the mean scores of the CBT and the EMDR for the satisfaction with the therapy variable (See Table 6).

**Table6 T-test analysis for satisfaction between CBT and EMDR groups**

Group	N	Mean	SD	t	df	Sig.p
CBT	9	26.88	2.31	.56	16	.57
EMDR	9	27.44	.60			

Note: \*Sig.p<.05

### **Discussion**

The findings of the present study indicated that CBT and EMDR could be efficacious for the PTSD children after being exposed to natural disasters. These results are consistent with the few studies comparing the effects of CBT and EMDR on the children.

Recently, several studies have found that CBT and EMDR treatments are powerful in the treatment of PTSD compared to other therapies. Jaberghaderi, Greenwald, Rubin, Zand, and Dolatabadi (2004) compared CBT and EMDR in sexually abused Iranian girls and the non-significant trend of self reported post-traumatic stress symptoms showed the superiority of EMDR over CBT. Moreover, EMDR benefited from significantly more efficacy with a large effect sizes on each outcome.

The results of this study are consistent with some studies conducted on adult populations. For instance, 2 meta-analyses were performed on the different treatment approaches and indicated that both trauma-focused CBT and EMDR were superior to stress management and other therapies. These results suggest that the first-line psychological treatment for PTSD should be trauma-focused CBT or EMDR (Bisson, Ehlers, Matthews, Pilling, Richards, Turner, 2007; Bisson & Andrew, 2007). The same efficacy of the two treatments modalities may be attributable to some

similarities between them. Based on the information processing model, accessing cognitive part of information network, identifying and developing a self stated negative cognition are essential in treatment of PTSD. In EMDR, a negative and positive cognition is identified/developed and then rated for accuracy. This approach is similar to rating of the negative and positive cognition in CBT as an essential part of cognitive restructuring. In EMDR, the patient is encouraged to bring all the negative parts of the traumatic event to awareness which is similar to exposure. Moreover, while remembering the event, emotions and physical sensations are present, identified, and rated, similar to exposure therapies and general behavioral principles.

In this study, in case the participants were satisfied with therapies, their mean scores in both groups showed high rating of satisfaction (about 70% of the maximum score) with the therapy.

Up to now, a few studies have evaluated the clients' satisfaction with therapy. For instance, Hogan (2001) compared the depressed children's satisfaction with therapy in both the CBT and the EMDR groups. The findings showed no significant difference between the two treatment groups in terms of satisfaction. Therefore, the results of Hogan's study are congruent with those of the present study.

The most obvious finding of the current study was the equal effectiveness of the two treatments in improving the children's PTSD symptoms. In fact, the results did not demonstrate the superiority of one treatment modality over the other.

One practical implication of this study is that mental health professionals can benefit from using either CBT or EMDR in treatment of the children who have been exposed to a natural disaster, such as earthquake. However, EMDR might be a better choice for PTSD children who do not show interest in doing homework and also those who have poor verbal communication skills. It is especially useful for younger children like preschoolers whose verbal communication skills are not as developed as older children.

Several factors limited confidence in the interpretation of the findings of this study.

The small number of participants requires cautious interpretation of the results of the study. The strict inclusion of PTSD children who did not show co-morbidity with other behavioral or mental disorders was the

next limitation of the study which limits the generalizability of the study results to clinical settings.

Thus, further research is necessary in order to evaluate the effectiveness of these therapies based on the types of traumatic experience and the severity of PTSD symptoms criteria in the children. Moreover, using the results of these investigations, therapist may be able to match the type of trauma with a more appropriate treatment for each client.

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