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Effectiveness of neuro-feedback treatment with alpha/theta method on PTSD symptoms and their executing function.

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Abstract

Neuro-feedback trains the brain to produce calm status. The specific areas of the brain affected by PTSD can also be targeted and trained to produce healthier patterns. Present study aimed to determine level of neuro-feedback treatment effectiveness with alpha/theta method on PTSD symptoms and also on their executing function. The present study was an experimental clinical trial with pre-test, post-tests and follow-up. Statistical population of present study includes all patients with PTSD in Kermanshah City, in which sampling was performed by convenience sampling. It shall be pointed out that all the samples were male. Individuals were randomly assigned in two experimental (n=15) and control (n=15) groups. Experiment group was put to attend 25 sessions, each lasting for 30 to 40 minutes of four times week for neuro-feedback individually. Follow Up was performed in final session after 45 days from both experiment and reference groups. Alpha/theta protocol was used in present research. Impact of Event Scale-Revised, Beck Depression Inventory-II, Wisconsin Card Sorting Test and Tower of London were used to collect data. Shapiro Wilk, Levene test, Means, Standard Deviations and Repeated measures were performed to analyse data. Results showed significant improvement for depression and PTSD symptoms; although improvements in depression were lower than PTSD symptoms. Treatment in initial meetings with these people because of chronic illness and sometimes unsuccessful efforts need plenty of patience so establishment relationship and understanding in this area and demonstrate scientific and medical understanding, cooperation and trust of patients are very effective.

Keywords: Neuro-feedback, Post-traumatic stress disorder (PTSD), Alpha/theta method.

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Introduction

Post-traumatic Stress Disorder (PTSD) defined as psychological responses to tension experience due to traumatic events (e.g. Fear, helplessness and horror) which diagnostic criteria of traumatic events re-experiencing, avoidance and over arousal, negative alterations in cognitions and mood also have been superimposed to it [1]. The rate of PTSD suffering is more common among vulnerable communities to traumatic events; such as groups that are exposed to war events [2]. Many of treatments are considered incursive treatment since they try to influence brain activity such as; surgery, shock treatment, and medical treatments, even though in most cases, disorder intervention require integration of biological and cognitive treatments. In this regard, one of emerging treatments so called neuro-feedback is performed in order to assist people by changing their brain performance without incursion [3]. This has wide application as method of learning to change brainwave activity for healthy individuals and patients with neurological and psychiatric disorders. For instance it's used to reinforce beta waves to improve healthy people's cognitive capabilities [4], to reinforce alpha waves for increasing relaxation [5,6] and reinforcement of theta waves for enhancement creativity [4].

Also Neuro-feedback have shown as tool to change the fluctuation in brain waves for people with epilepsy by changing the SMR, ADHD treatment through increasing SMR relative to theta [7] and reduction of anxiety symptoms through reinforcing alpha [8].

Neuro-psychological functions are considered as powerful intermediate that working as connecting factors between disorders clinical symptoms and biological neurological etiology [9]. There are evidences that PTSD is associated with brain malfunctioning and cognitive dysfunction and evidences have been given executive malfunctioning in the patients with this disorder [10-16].

Therefore this improves performance neuropsychological individuals in particular, i.e. executive performances through different scientific methods, brings personal, social and economic advantages [17]. Indeed executive performances intervene learning process [18] and also influence on emotional control [19]. Few studies have directly been carried out to evaluate neuro-feedback effectiveness on executive function in various disorders and thus further researches are required to indicate effectiveness of strategy by individuals' performances in executive performances that mainly are affected by frontal lobe [20].

As researches of neuro-psychological capabilities have revealed that specific oscillatory rhythms and certain wave synchronization are accompanied with certain cognitive processes [21,22] and separate frequency bands have different effects on cognitive processes such as object detection [23], mediating attention [24], working memory [25] and working memory and memory consolidation [26]. Wave synchronization is considered as mechanism of increased communication between cerebral areas [27,28]. In this regard one may point out role of theta wave in memory consolidation [29] and long-term memory flexibility with memory consolidation [30]. Theta wave role has also been indicated in learning and memory about medial prefrontal cortex and hippocampus system [31].

Major application of neuro-feedback treatment has been on executive functioning in ADHD disorder and generally results showed that neuro-feedback may be accounted as hopeful treatment method [17]. In this regard, neuro-feedback positive effects on hyper-active children's executive performances through various studies [32] and its treatment effect has been showed on information processing speed and executive performances in the elderly people [8]. In those people with PTSD in addition to have over arousal and continuous monitoring of environmental stimuli concerning trauma, nervous system balance is disrupted and lead to beta waves activity as trauma outcome, which in turn troubles individual's consistent information processing within executive performances framework [33].

As before mentioned PTSD disorder includes set of symptoms such as; anxiety, depression and over-arousal, nuisance thoughts. It is reasonably highly probable for neuro-feedback to be effective in treatment of PTSD as considering fact that improvement of such symptoms is separately shown in different disorders by neuro-feedback. Despite the promising results of neuro-feedback on individuals with PTSD in few studies which showed its positive effect [34-36]. Christ and Reiner [37] described remedial effects of neuro-feedback to its environment than treatment itself. Villanueva, Benson and LaDou [35] collected data in 350 people of marine forces of the United States who were exposed to war psychological symptoms to evaluate neuro-feedback effectiveness. Results indicated that many of these people showed significant improvement within vast spectrum of symptoms include flashbacks, nightmares, sensitivity, low quality sleep, despair and other symptoms. In this study results are somewhat encouraging which authors concluded that improvement of symptoms varies widely reflects broad regulatory effect of this treatment on brain waves and mental and behavioural outputs. Nonetheless and according to a few studies which sometimes contradictory in this area, and also role of executive performances, further studies are required to evaluate effectiveness of neuro-feedback on different aspects of PTSD. Also recently PTSD disorder has been excluded in DSM-V from the anxiety disorders category due to the differences in cause, path, outcomes, and method of treatment and this was added to the cognitive criteria as considering important infrastructure of cognition. So cognitive aspect and executive performances are the most important aspects in patients which can be studied. Researchers try to understand more details of principal processes besides acquiring more knowledge to assist the therapists. Thus, present study aimed to determine level of neuro-feedback treatment effectiveness with alpha/theta method (alpha/theta remedial protocol for over-stimulation disorders, i.e. stress disorder after incident has proved more useful rather than other remedial protocols) on PTSD symptoms and also on their executing function.

Methods

The present study was an experimental clinical trial with pre-test, post-tests and follow-up.

Statistical population includes all patients with PTSD in Kermanshah City.

Sample and sampling method

Sampling was performed by convenience sampling among people who referred to hospitals and treatment centres in Kermanshah city which includes clinics and private practice centres that and SCID diagnostic interview was carried out to identify PTSD. It shall be pointed out that all the samples were male. Individuals were randomly assigned in two experimental (n=15) and control (n=15) groups.

Participants were between 25 to 60 years old. 25 persons were married (83.3%), 5 persons were single (16.6%). 3 persons (10%) were at the level of 8 years of formal education, 8 persons (26.6%) had high school diploma, 7 person (23.3%) had associate's degree, 10 persons (33.3%) had bachelor's degrees, 2 persons (6.6%) had master's or higher educations. From 25 married persons, 9 persons (36.9%) had no children, 11 persons (44%) had one child, 5 persons (16.6%) had two children, 69 persons (4.9%) had three children and 26 persons (1.8%) had four children or more.

After identifying samples with necessary criteria and also after acquiring their personal agreement to participate through offering sufficient explanation, they were randomly divided in two groups of experiment and control. Including criteria: 1-war PTSD diagnosis based on a psychiatrist's opinion and its verification via SCID; 2-between 30 to 50 years of age; 3-education was minimum primary school; 4-having minimum physical and cognitive ability to participate intervention sessions; 5-conversant agreement with method of treatment

and research process; 6-presenting no sign of psychotic and bipolar disorders; and 7-having no serious limiting physical illness, such as cancer or kidney problems.

Both experimental and control groups were homogenized in age and level of education marital status variables.

Experiment group was put to attend 25 sessions, each lasting for 30 to 40 minutes of four times week for neuro-feedback individually. Follow Up was performed in final session after 45 days in experimental and control groups.

Alpha/theta protocol was used in present research.

Alpha/theta protocol

Alpha/theta protocol purpose which was performed in state of relaxation with eyes closed is to increase theta waves ratio (4 to 8 Hz) in mid and frontal areas of brain relative to alpha waves (8 to 12 Hz) (although is considered increasing in both waves). Alpha waves activity in brain is usually higher than that of the theta. This protocol is widely used to upgrade personal performance in different fields [4].

Since at time of predominance of theta waves, person is more distortable and more relaxed in emotion, this would be proper step for the person to reconstruct the cognitive structure in more positive method. It should be noted that American Society of Psychology approved of neuro-feedback as one of the methods of treatment for PTSD that after successful results of this treatment protocol [15].

The participant has obtain situation of maximum relaxation during performing protocol; after installation of electrodes, according to the aforementioned treatment protocol and based on international system 10-20, on the head skin and earlobes and prior to commencement, they were been asked to calmly be seated, relax their muscles, regulate and calm their breath, and close their eyes. Mental image helps participants to increase their cerebral theta waves, thus they were required to recall positive memory after which feedback was presented to them in the form of audio. This feedback was combination of sound of river waves, waves in ocean and background sound. Once alpha waves rise in cerebral cortex area, sound of river waves reaches high, while theta waves dominate, sound of ocean waves in boosted. The participants have been asked to listen to sounds of waves from river and ocean periodically, in method way that every time they clearly hear the sound of river waves (associated with alpha waves), they try to boost their theta waves by mental image construction so that they were able to hear sound of ocean more clearly and loudly and then try to hear sound of river waves again. Finally, after initial assessment was referred to treatment of asylum and after group specification, IES-R, BDI, WCST and TOL were performed as pre-test then finally participants were informed about time of presence and procedure. To do so and to initiate evaluation, Active, Reference and Ground electrodes were positioned at pz point, right ear, and left ear, respectively. 90 seconds with open eyes and 90 seconds with closed eyes was registered per electrode. Active electrode was similarly positioned on four other point s (p3, p4, o1, o2) and data was registered. After removal of Artifacts, next step was to calculate each participant's individual alpha frequency. Prior to treatment initiation, relaxation was instructed to the participants through muscle progressive relaxation and diaphragm breathing. After ensuring of proper implementation treatment session was started by choosing alpha/theta window. The related setting was carried out with window include delta domain determination which warns to prevent participants from falling asleep. Room lighting was adjusted and sound played in the environment was maintained steady. It should be mentioned that follow-up time was defined as course of forty five days.

Shapiro Wilk, Levene test, Means, Standard deviations and repeated measures were performed to analyse data.

Measures

Impact of event scale-revised: The IES-R [38] is a 22-item self-report questionnaire measuring PTSD symptoms in response to a specified trauma. The Farsi version of IES-R was used in this study which has been validated for use in Iran [39]. In current study internal consistency was good (α=0.83).

Beck depression inventory-II (BDI-II): The Farsi version of the BDI-II [40] was used to measure depression symptoms. The reliability (experiment-experiment reliability, r=0.76; internal consistency α=0.85) and validity of the Farsi measure have been found to be good [39].

Wisconsin card sorting test (WCST): The WCST [41] involves presenting participants with a pack of cards and participants are instructed to sort the cards on the basis of some rule which, once the rule has been acquired, continues to change until all the cards have been sorted [42]. For each participant the following is scored and has been considered measure of executive function; number of correct categories (number of categories sorted with ten consecutive correct responses), perseverative errors (all incorrect responses that contained match to the preceding sorting category), and perseveration of the preceding response (exact repetitions of the directly preceding incorrect response) [43]. The standardized version normed for Iranian populations was used and the psychometric properties have been reported to be good in Iranian samples [44].

Tower of London (ToL): The ToL [45,46] contains two boards with pegs and beads of different colours which are used to present problem-solving tasks. The performance of examinee is compared to representative samples of individuals same age in order to derive hypotheses about the person's executive cognitive ability. The standardized version normed for Iranian populations was used [39].

Findings

Covariance analysis was used to evaluate data normality and covariance, and homogeneity of pre-test scores between the two groups. In order to examine the normality data, the Shapiro Wilk test was used. The Levine test was used to evaluate homogeneity of variance within groups. According to the data

in Tables 1 and 2, the findings were not significant (α=0.05 level). Assumptions were inferred about normality and homogeneity of data covariance and regression slope, and the use of covariance were permitted for evaluation of assumptions with homogeneity of covariance.

Table 1. *Results of Shapiro wilk test for evaluation of normality of data.*

Shapiro wilk test			Group	Variable
	df	Sig.		Impact of event scale revised (IES-R)
0.499	15	0.271	Experimental group	Depression (BDI)
0.642	15	0.126	Control group	
0.572	15	0.180	Experimental group	Administration time (TOL)
0.589	15	0.091	Control group	
0.601	15	0.214	Experimental group	Copy time (TOL)
0.573	15	0.152	Control group	
0.457	15	0.130	Experimental group	Score (TOL)
0.625	15	0.650	Control group	
0.542	15	0.061	Experimental group	Number of error (WCST)
0.428	15	0.093	Control group	
0.357	15	0.420	Experimental group	Perseveration response (WCST)
0.415	15	0.401	Control group	
0.927	15	0.071	Experimental group	Number of category completed (WCST)
0.889	15	0.091	Control group	

Table 2. *Result of Levene's test for homogeneity of intergroup variance of data.*

Leven's Test				Variable
Sig	df2	df1	F	
0.219	28	1	1.864	Impact of event scale revised (IES-R)
0.708	28	1	3.731	Depression (BDI)
0.181	28	1	4.359	Administration time (TOL)
0.650	28	1	3.279	Copy time (TOL)
0.156	28	1	2.364	Score (TOL)
0.778	28	1	3.207	Number of error (WCST)
0.101	28	1	4.980	Perseveration response (WCST)
0.210	28	1	3.135	Number of category completed (WCST)

Table 3. *Means, standard deviations for psychopathology and executive functioning measures.*

Follow up		Post-test		Pre-test		Group	Variable
SD	M	SD	M	SD	M		
5.20	30.46	6.23	30.40	7.63	47.20	Experiment	Impact of event scale revised (IES-R)
6.25	51.21	6.18	51.14	5.37	51.07	Control	
6.62	27.40	6.01	27.86	6.78	37.66	Experiment	
6.88	40.40	6.92	39.92	8.12	39.78	Control	Depression (BDI)
22.55	70.06	24.17	66.60	15.02	81.26	Experiment	Administration time (TOL)
31.87	92.06	15.72	88.85	22.32	89.64	Control	
19.56	85.73	24.73	83.73	16.29	92.20	Experiment	Copy time (TOL)
27.15	86.21	22.21	92.64	16.49	90	Control	
3.18	28.13	3.59	27.93	5	22	Experiment	Score (TOL)
3.07	23.28	3.96	23	5.09	23.28	Control	
15.25	19.20	21.85	34.06	22.73	75.66	Experiment	Number of error (WCST)
25.04	46.64	22.94	63.63	21.35	73.70	Control	
9.01	9.72	16.68	18.86	18	49.80	Experiment	Perseveration response (WCST)
18.49	26.50	22.07	41.35	17.89	50.42	Control	
0.73	5.60	1.32	5.20	1.84	2.46	Experiment	Number of category completed (WCST)

1.67	4221	1.55	3.57	1.65	3.21	Control

Table 3 shows mean and standard deviation of the impact of event scale revised, depression, subscale of the Tower of London test and Wisconsin card sorting test at different stages of the evaluation in groups. Regarding to the point that score mean in IES in both groups in pre-test level is above 45. It seems that this study faces high levels of symptoms of this disorder. The result of analysis of variance for repeated measures that was used to test effectiveness of Neuro-feedback is shown in Tables 4 and 5.

Table 4. *Results of repeated measures (within subject) for psychopathology and executive functioning measures.*

variable		F (2,54)	Eta squared	Mauchly test (df=2)
Impact of event scale revised (IES-R)	Main effect	33.04**	0.54	0.24
	Main effect* group	33.72**	0.55	
Depression (BDI)	Main effect	17.31**	0.39	----
	Main effect* group	16.54**	0.38	
Administration time (TOL)	Main effect	1.66	0.058	0.33
	Main effect* group	1.83	0.064	
Copy time (TOL)	Main effect	1.13	0.040	0.14
	Main effect* group	1.03	0.036	
Score (TOL)	Main effect	8.87**	0.24	0.17
	Main effect* group	9.70**	0.26	
Number of error (WCST)	Main effect	52.84**	0.66	0.37
	Main effect* group	8.12**	0.23	
Perseveration response (WCST)	Main effect	41.43**	0.60	0.89
	Main effect* group	5.09**	0.15	
Number of category completed (WCST)	Main effect	12.30**	0.31	0.60
	Main effect* group	2.60	0.088	

**Sig. (0.01)

As Table 4 shows hypothesis of homogeneity of covariance is confirmed thorough Mauchly test. Main interfering effect according to Neuro-feedback for variables of impact of event scale revised: F (2, 54)=32.04, p<0.001, ηp2=0.54, score in TOL: F (2, 54)=8.87, p<0.001, ηp2=0.24, number of errors: F (2, 54)=52.84, p<0.001, ηp2=0.66, Perseveration response: F (2, 54)=41.34, p<0.001, ηp2=0.60 and Number of category completed: F (2, 54)=12.30, p<0.001, ηp2=0.31 in WCST test were significant in three levels.

Table 5. *Results of repeated measures (between subjects) for psychopathology and executive functioning measures.*

Variable	F (1, 27)	Eta squared
Impact of event scale revised	63.84**	0.70
Depression	13.73**	0.33
Administration time	6.74*	0.20
Copy time	0.157	0.006
Score	5.70*	0.17
Number of error	8.36**	0.23
Perseveration response	7.06*	0.20
Number of category completed	6.75*	0.20

**-Sig (0.001), *-Sig (0.01)

Repeated measures' results are provided in Table 5 showed that intervention produced significant improvement for posttraumatic stress disorder symptoms, depression and executive functioning measures. It can be argued that independent variable had caused significant difference between the experimental and control groups.

Discussion

Present study was conducted to evaluate neuro-feedback alpha/theta effectiveness on executive performances, depression and war PTSD symptoms improvement. Results showed significant improvement for depression and PTSD symptoms; although improvements in depression were lower than PTSD symptoms. It shall be mentioned that this protocol is classically used to treat anxiety disorders, however, that signs of depression are inevitable parts of chronic disorders and also for present research participants probability of depression due to long-term illness and having annoying emotions, neuro-feedback treatment was able to lower PTSD symptoms directly while indirectly affecting signs of depression. On the other hand, some PTSD symptoms, such as insomnia, concentration problems, limited affection and feeling of short future are identical to that of depression and that neuro-feedback effects on such symptoms may reduce depression and PTSD symptoms simultaneously. Present findings are consistent with studies of Huang-Storms, Bodenhamer-Davis, Davisand Dunn [47] and Peniston and Kulkosky [48] on basis of depression and PTSD symptoms improvement.

Intervention based on alpha/theta protocol is based on powerful relaxation schedule which is widely used as method of treatment for anxiety disorders, include PTSD. However it seems this treatment has more scientific procedure and more

accurate remedial applications due to direct focus on alpha and theta waves reinforcement. It is necessary to note that reason of use of this protocol for the normal participants differs from those with chronic anxiety disorders so that use of protocol for disordered mostly aimed to maintain brain waves performance balance and nervous system dynamics. theta waves activity and dominance has decreased in patients with PTSD so this is indirect result of presence disorder symptoms and symptoms of PTSD would be reduced by increasing wave activity within dorsal lobe and simultaneity with reinforcement alpha and theta wave [26]. Indeed activities of waves for these individuals were reduced due to be being over-alert and stimulated which led to other wave's activity; such as beta. Somehow, consistent assignment of waves' activity moved away from normal condition and brain dynamics has been deteriorated to acquire balance of power because of PTSD caused by external stimuli. Also results showed significant increase in performance in most subscales measuring executive functions in experiment group. The ability of reasoning, planning and problem solving through Tower of London (TOL) test was to evaluate relationship between two groups after treatment were significantly different so that obtained score and administration time for the experiment group improved. The improvement may be partially accounted for the intervention and brain alpha and theta waves reinforcement [49], activity of these were restricted in patient with PTSD due to stimulation and being over-alert.

Similar to these results, changes in perseveration which was evaluated by WCST were meaningful in the most of the sub scales.

In fact, most of the psychological nerve injury can occur due to the inability of the nervous system for optimal performance and executive performances dysfunction may be regarded as external representation of cognitive nervous malfunctioning and that may be considered disorder in frequency and abundance brain waves. In this regard, it can be concluded that Neuro-feedback training is systematic method of controlling level of arousal to change people. So that nervous system is dynamically challenging for better performance in regard to abundance and frequency of brain waves [50].

Theta wave activity regarding neuro-psychological capabilities is mostly associated with frontal and parietal-occipital cortex [51] hence Pz area within the dorsal lobe was selected as target in the present research.

Also theta wave activity associated with encoding and retrieving information while performing administrative duties.

In this regard, in people with PTSD overcome and activities decreased theta waves, indirect result of such circumstances is presence of disorder symptoms and increase activity of these waves within dorsal lobe accompanied by simultaneous reinforcement alpha and theta waves would reduce PTSD symptoms [26] which seem influence the neuro-psychological capabilities. Low alpha reinforcement in the dorsal lobe and the visual cortex also plays an inhibitory role that prevents irrelevant data entrance during executing assignments processing within working memory framework, leads to faster more accurate working memory performance [26]. On the other hand, Klimesch et al., [49] reported relation between alpha and information processing in long-term memory and it can be said that executive performances improvement caused by alpha/theta protocol application in Pz area is due to role of these waves in performance of appropriate tasks. Confirmation of the present study's hypothesis based on brain wave activity patterns improves performance and dynamism of which is led to the result by intervention and alpha and theta waves reinforcement. According to results, it shall be noted that alpha/theta protocol application for patients with PTSD is significant in two aspects. First, waves activity in such individuals is reduced due to emergence of excitation and being over-alert symptoms and activity of other waves, e.g. beta, has increased and leading to inconsistent activity division with normal state and deterioration of brain dynamism to achieve balance due to external stimuli strength that cause PTSD. On the other hand, role of such waves shall be noted in properly performing the assignments. For instance, in Jau sovec and Jau sovec's study [26] working memory reinforcement led to alpha and theta waves reinforcement within dorsal and frontal lobes through special assignments. As a result of this study is consistent with other information, recent studies reported role of alpha and theta waves in the processing of administrative tasks [22,49,51]. Gruzelier [4] also indicated that reinforcing alpha/theta in individuals leads to creativity in executing assignments and generally alpha/theta protocol application improve performance in music, working memory, mental rotation assignments, anxiety reduction and anxiety disorders improvement, maintaining attention, synaptic flexibility and reduction of depression have also been reported in literature [4]. Based on neurology has been stated that low rhythm waves align flashbacks and memory actions with motor sensory integration associated with nervous system [4].

Thus, as noted executive functions for adaptive interaction with environment is essential in many activities and method that can disrupt the execution of those capabilities, improvement of scientific and therapeutic value of that protocol seems alpha / theta is one of them.

As clinical observations, it shall be mentioned that the patients in present study expressed re-experiencing events which they had experienced during war with levels of anxiety and stimulation that seemed substantially higher than normal.

This could be due to strengthening of theta wave activity that person's attention is focused to inner world during this wave of activity and maybe individuals use less defensive mechanisms such as denial, suppression, and avoidance. Under such circumstances person probably tries to reconstruct and solve traumatic events through repeated experience of traumatic events and confronting them by healthier strategies.

Therefore, as considering fact that avoidance after experiencing trauma is one of the main reasons of symptoms continuation and individuals with this disorder extremely use it, it seems one the treatment principles for this type of disorder is on the basis of reducing individual's avoidance that occurs

remedial confrontation. This is probably is due to reinforcement of theta wave activity and activity that alters person's attention from outside to inside and considering fact that this type of wave acts in reverse to excitation and being-alert, such patients experience conditions that are less observed during the illness.

Conclusion

Since alpha wave activity may be accounted for boundary between attention and concentration to outer world and that theta wave activity be regarded to altering attention towards inner world, it seems treatment dynamism that takes place in alpha/theta protocol is caused by the abundant EEG activity crossover between alpha and theta wave activity due to repetitive application of this protocol by the patient during therapy session.

Present study results as well as results of other researches generally declare flexibility and dynamism of nervous system to form and adapt under special conditions which establish our understanding of this dynamism to intervene and lead scientific goals in this context. Results also reveal that intervention by neuro-feedback for those with PTSD may have significant remedial implications. It shall be mentioned that there is no knowledge of neuro-chemistry and neurology basis of disorder as influenced by neuro-feedback intervention thus our probable conclusion is principally based on literature in which such changes have been reported [34].

It is important to consider that relaxation techniques should be used at the beginning neuro-feedback treatment for the most patients with PTSD of war in Iran. Treatment in initial meetings with these people because of chronic illness and sometimes unsuccessful efforts need plenty of patience so establishment relationship and understanding in this area and demonstrate scientific, medical understanding, cooperation and trust of patients are very effective. Future studies also need to address how these medication treatments can be optimally combined with behavioural treatments. A good example of such approach is on-going study conducted by Foa and Williams [52] which combined naltrexone with exposure treatment for individuals with PTSD. Treatment arms include naltrexone alone, exposure treatment alone, combination of naltrexone and exposure treatment, and a placebo pill. Such studies will provide better guidance for the clinical management of patients with PTSD.

Conflict of Interest

Authors declare that they have no competing interests.

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