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A review on the impact of cognitive rehabilitation on patients with traumatic brain impairment

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Abstract

Objectives: Traumatic Brain Injury (TBI) is one of the most major causes of disability, especially cognitive problems and mortality in worldwide. Present study aims are the effect of cognitive rehabilitation for improving cognitive function in patients with traumatic brain injury.

Methods: This study was reviewed by using a search of keywords including Cognitive Rehabilitation, Traumatic Brain Injury (TBI) in google scholar, pubmed, Elsevier databases. Approximately 30 articles were selected that were fully reviewed.

Conclusion: Cognitive rehabilitation with software improves brain injury patients and can be used as a complementary treatment method along with surgical and drug treatments.

Keywords: Cognitive rehabilitation; Attention; Traumatic brain injury (TBI).

Introduction

Traumatic Brain Injury (TBI) can be called a silent epidemic and is not of a degenerative, vascular, infectious, or congenital nature [1,2]. TBI is associated with significant disability and a variety of neurological and physical disturbances including fatigue, dizziness, headaches, chronic pain, balance problems, sensory loss, and sleep problems [3,4] and also it leads to cognitive disorders such as memory, attention, processing speed, word finding and executive functions [2,5]. Today, several treatment and rehabilitation methods are used with cognitive rehabilitation software that selects different educational programs to the specific conditions of each patient [6-9]. Therefore, due to the lack of people's information about the effect of computer-based cognitive rehabilitation and softwares in brain injury patients, the purpose of this review is to promote the effect of computer-based cognitive rehabilitation with software in patients with traumatic brain injury.

Discussion

Cognitive rehabilitation can be defined as the set of procedures and techniques that are aimed to design therapeutic strategies for the rehabilitation of cognitive disorders, based on neural plasticity [5]. Reports related to the use of programs according to the techniques used and effectiveness evaluation tools have been done in the studies. Pantzartzidou et al. investigated the effect of cognitive rehabilitation using Rahacom software in patients with traumatic brain injury and showed that the attention and concentration ability of the experimental group improved significantly after 4 months of using this software [10]. Reports of traumatic brain injury using computer-assisted cognitive rehabilitation have shown improvements in short term visual memory [11-13]. In a review article, it was suggested that computer-assisted memory training is effective if the sessions are therapist-driven train basic memory skills, and are tailored to the brain-damaged patient [14]. De Luca et al in an evaluation of a computer-based cognitive training program among 34 patients with TBI reported significant improvements in all dimensions of cognition, functioning and depression [15]. Fernandez and colleagues in evaluating the effectiveness of RehaCom cognitive training among participants with acquired brain injury showed that all dimensions of neuropsychological status and memory improved [16]. Lebowitz et al. evaluated the feasibility and using a software program for computer-based mental exercises, in people with a history of TBI. The study findings included small effect sizes on neuropsychological assessment scores and behaviors [17]. Zickefoose et al. examined the timing of two computerized brain game

software programs among participants with severe TBI with a mean time post-injury of 4 years. All participants significantly improved their level of difficulty on intervention tasks and there was a trend towards generalization to daily tasks [18].

Conclusion

TBI is associated with significant morbidity and mortality [19,20]. Previous studies have shown that TBI causes neural damage and neurodegeneration, which may lead to neurological, and psychiatric problems [21,22]. Recent studies have shown that about 40% of patients with severe TBI develop Cognitive deficits, which can seriously affect the patients' rehabilitation and quality of life [23,24]. One of the most effective ways to reduce the impact of cognitive disturbance in everyday life is cognitive rehabilitation, which is based on the principles of brain neuroplasticity [25]. Neuroplasticity includes a wide spectrum of changes at different levels of the nervous system's organization, which can also have a role in the recovery after brain damage [26]. Plasticity gives the brain a very different and distinctive feature and understanding the factors associated with plasticity will maximize behavioral gains during rehabilitation [27]. Evidence shows that computer programs following the concept of neural plasticity enhance memory, processing speed, executive functions, and reasoning capabilities in people with traumatic brain injury [28-30].

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