

REVIEW ARTICLE

Cognitive Behavioral Therapy to Improve the Quality of Life for Post-TBI Patients: A Literature Review

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ABSTRACT

Cognitive Behavioral Therapy (CBT) has increasingly gained recognition as an approach to enhance the quality of life for post-Traumatic Brain Injury (TBI) patients. Post-TBI often presents significant emotional and cognitive challenges for those affected. In this context, CBT emerges as an effective tool to assist patients in coping with the psychological aftermath of TBI and restoring stability in their lives. This review article to analyze the impact of Cognitive Behavioral Therapy on post-Traumatic Brain Injury patients. This research used a literature review method was applied to nine articles obtained from various databases, including Wiley Online Library, ScienceDirect, SCOPUS, Cochrane Library, and Springer Link. The search keywords used were "cognitive behavior therapy," and "post-traumatic brain injury," with "AND" as the Boolean operator. Article selection was carried out using the Critical Appraisal Duffy, which consists of 51 items, with categories of superior papers or a score ranging from 205 to 306. CBT has the potential to enhance the quality of life for patient with post-Traumatic Brain Injury and may reduce symptoms in some, within the context of outpatient brain injury rehabilitation services. CBT also fosters more optimistic expectations for recovery and reduces symptoms of post-treatment depression and anxiety. CBT therapy can be one of the supportive alternatives in the treatment of post-TBI patients to improve their quality of life.

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INTRODUCTION

Traumatic Brain Injury (TBI) is a complex health condition that often significantly alters the lives of those affected. Post-TBI patients frequently experience a range of physical, cognitive, and emotional challenges that affect their quality of life [1]. One approach that has garnered attention in improving the quality of life for post-TBI patients is Cognitive Behavioral Therapy (CBT). This therapy focuses on the relationship between an individual's thoughts, feelings, and behaviors and has proven effective in various mental disorders and medical conditions. In the context of post-TBI patients, CBT can be used to help them cope with physical and psychological symptoms arising from head injuries [2, 3].

Traumatic Brain Injury (TBI) is an injury to the brain caused by various factors such as traffic accidents, falls, physical violence, or even sports accidents [4, 5].

Post-TBI patients often experience physical symptoms like headaches, vision disturbances, and muscle weakness, along with cognitive issues, including difficulty concentrating, memory loss, and decision-making difficulties [6, 7]. Furthermore, they frequently face emotional problems, such as depression, anxiety, and behavioral changes. The quality of life for post-TBI patients is often disrupted by these symptoms, affecting their social relationships, employment, and daily life [8]. Managing post-TBI patients is a complex challenge, and there is no universally effective approach to address these diverse symptoms [9]. Commonly used therapies, such as physical and speech therapy, may not fully address the cognitive and emotional issues faced by post-TBI patients. Hence, it is essential to explore additional approaches that can help post-TBI patients recover their quality of life [10, 11].

The prevalence of TBI cases may vary based on factors such as age, the type of accident, and geography [12]. However, TBI is a significant health issue worldwide. According to the World Health Organization (WHO), TBI is a leading cause of disability and death globally [13, 14]. In the United States alone, the Centers for Disease Control and Prevention (CDC) reported over

2.8 million emergency department visits related to TBI in 2019. This illustrates that TBI is a widespread and significant health problem with extensive impacts on patients and healthcare systems [15].

Despite various approaches used in TBI management, previous research indicates that there are still gaps in our understanding of how CBT can be effectively used to improve the quality of life for post-TBI patients. Previous studies tend to be limited in scope and focus on specific aspects of TBI [16, 17]. For example, some research focuses more on the physical aspects of patients, such as physical rehabilitation, while others concentrate on psychological and emotional issues.

Moreover, there is limited research explicitly investigating how CBT can be adapted to meet the specific needs of post-TBI patients. This creates an opportunity to bridge gaps in research and understand how cognitive behavioral therapy can help patients cope with diverse symptoms, such as depression, anxiety, or cognitive impairments. The objectives of this research to explore the effectiveness of Cognitive Behavioral Therapy (CBT) in enhancing the quality of life in post-TBI patients

MATERIAL AND METHODS

A literature review method was applied to nine articles obtained from various databases, including Wiley Online Library, ScienceDirect, SCOPUS, Cochrane

Library, and Springer Link. The search keywords used were "cognitive behavior therapy", "quality of life" and "post-traumatic brain injury," with "AND" as the Boolean operator. A total of 815 articles were retrieved from the databases. The selected articles met specific criteria, which included being original research with CBT interventions, utilizing the RCT method, having publication dates between 2013 until 2023, and being available for full download through the databases. Articles were excluded from the analysis if they had a small sample size of fewer than 20 respondents. In cases where the same article appeared in multiple databases, one version was chosen. Ultimately, 9 articles met the specified criteria. Article selection was carried out using the Duffy Critical Appraisal Criteria, which consists of 51 items, categorizing them as excellent articles with scores ranging from 205 to 306.

RESULTS

Table I presents nine studies that identified cognitive behavioral therapy provided to patients with anxiety and depression. All studies used the RCT method with sample sizes ranging from as few as 24 respondents to as many as 720 respondents. Eight studies involved cognitive behavioral therapy for post-TBI patients in adults, while the rest focused on pediatric patients. Two studies conducted observations over 16 to 30 weeks to assess changes after cognitive behavioral therapy.

Table I: Characteristic of studies included

	Methods, Sample Size	Result
J. Ponsford, 2015	RCT, 75 respondents	Adapted CBT groups showed significantly greater reduction in anxiety and depression on the Hospital Anxiety and Depression Scale and the Depression Anxiety and Stress Scale, and greater gains in psychosocial functioning on Sydney Psychosocial Reintegration Scale over 30 weeks post-baseline relative to Waitlist Control (WC)
C. Sannibale, 2013	RCT, 33 respondents	Participants who had received one or more sessions of exposure therapy exhibited a twofold greater rate of clinically significant change in clinician-administered PTSD scale (CAPS) severity at follow-up than Alcohol-Support (AS) participants
C. Lewis, 2019	RCT, 720 respondents	CBT can be associated with clinically significant reduction in PTSD symptoms compared to a waiting list. However, the text does not provide further details regarding the specific outcomes of each study conducted.
J. Fann, 2015	RCT, 100 respondents	CBT can significantly improve depression symptoms in adults with Major Depressive Disorder (MDD) within 10 years post-TBI. Although there were no significant differences between the CBT group and standard care over 16 weeks, the CBT group showed a more significant improvement in the Symptom Checklist-20 reported by patients compared to the Usulan Care (UC) group in the follow-up comparison.
S. Potter, 2015	RCT, 40 respondents	Cognitive behavioral therapy (CBT) is effective in reducing persistent post-brain injury symptoms. Participants receiving CBT reported an improvement in their quality of life and better health status compared to the control group.
L. Tomfohr-Madsen, 2019	RCT, 24 respondents	CBT can help reduce insomnia symptoms and improve sleep quality in adolescents with persistent post-concussion symptoms. However, since this is a pilot study with a small sample, the results should be considered as preliminary findings that require replication in larger efficacy trials.
D. Kjeldgaard, 2014	RCT, 30 respondents	Cognitive Behavioral Therapy (CBT) has not been proven to be effective in managing chronic post-traumatic headache (CPTH) after a mild head injury. Although there were no significant differences between the treated group and the waiting list group in post-treatment outcome measures, researchers found that both groups experienced a significant improvement in headache symptoms and quality of life.
L. Talbot, 2014	RCT, 45 respondents	CBT is effective in improving sleep quality in individuals with PTSD experiencing sleep disturbances. Furthermore, CBT can also reduce overall PTSD symptoms. However, this research has some limitations, such as a small sample size and the absence of a control group not engaging in self-monitoring.
L. Murray, 2015	RCT, 257 respondents	Trauma Focused-Cognitive Behavioral Therapy (TF-CBT) is more effective in reducing trauma and stress symptoms in orphaned and vulnerable children in Lusaka, Zambia, compared to standard care.

Table II presents the risk of bias and methodological quality of each study. Five studies have the potential for non-compliance with the established intervention in the treatment group. The duration of CBT administration has not been well explained. Four studies need to identify the proportion of missing patient data in the intervention and control groups and do not provide clear reasons for the missing data. This missing data could affect the analysis results if it exceeds approximately 30% of the total study subjects, and an intention-to-treat analysis needs to be conducted.

Table II: Risk of bias methodology quality of each study

First author, Year	Randomization Process	Deviation from intended interventions	Missing outcome data	Measurement of the outcome
J. Ponsford, 2015	+	+	+	+
C. Sannibale, 2013	+	–	–	+
C. Lewis, 2019	+	+	+	+
J. Fann, 2015	+	–	–	+
S. Potter, 2015	+	+	–	+
L. Tomfohr-Madsen, 2019	+	+	+	+
D. Kjeldgaard, 2014	+	–	–	+
L. Talbot, 2014	+	–	+	+
L. Murray, 2015	+	–	+	+

Note: + low risk; – high risk

DISCUSSION

Effectiveness of CBT

The analysis of the articles revealed that seven studies provided comprehensive details about CBT therapy. These studies reported that CBT, whether administered directly, via remote communication (such as mobile phone connections), or a combination of both, was significantly effective in reducing depressive symptoms in post-trauma patients. Research from Smith in 2020, found that patients who received CBT remotely experienced a 40% reduction in depressive symptoms compared to the control group [18]. Another study from Jones & Brown in psychology demonstrated that direct CBT interventions led to substantial improvements in mood and overall mental health, with a 50% decrease in depressive symptoms [19].

Moreover, the effectiveness of CBT in addressing insomnia among post-care trauma patients was also well-documented. Several studies highlighted that CBT significantly improved sleep quality and reduced insomnia symptoms. Trauma patients undergoing CBT reported better sleep efficiency and reduced sleep onset

latency, with improvements sustained over a six-month follow-up period. Additionally, CBT for insomnia (CBT-I) yielded significant benefits in sleep quality and duration among patients with a history of trauma [20, 21].

These findings underscore the versatility and efficacy of CBT in treating both psychological and physiological symptoms associated with trauma. The consistent positive outcomes across various delivery methods and patient demographics highlight CBT as a robust and adaptable intervention for enhancing mental health and well-being in post-trauma patients. Such evidence from reputable journals reinforces the credibility and practical value of incorporating CBT into therapeutic protocols for trauma-related conditions.

Frequency of CBT sessions

The study revealed that CBT therapy, conducted over six sessions, had an average attendance rate of 4.9 sessions per respondent. These sessions were structured to cover essential components of CBT for insomnia (CBT-I), which included: (1) Introduction, (2) Relaxation Training, (3) Stimulus Control, Sleep Consolidation, and Medication Use, (4) Cognitive Therapy, (5) Sleep Hygiene, and (6) Awareness and Relapse Prevention. This structured approach is consistent with established protocols in the literature. For instance, a study about CBT in insomnia, demonstrated that a similar six-session CBT-I program effectively reduced insomnia symptoms and improved sleep quality in a significant number of participants [22]. The effectiveness of such a structured CBT-I program is supported by various studies. For example, a research article in Sleep Medicine reported that a six-session CBT-I program led to notable improvements in sleep efficiency and reductions in insomnia severity, with participants attending an average of 4.7 sessions [23]. Another study found that participants who attended at least four sessions of a six-session CBT-I program showed significant improvements in sleep quality and duration, highlighting the importance of consistent attendance to achieve optimal outcomes [24].

The structured nature of the CBT-I sessions ensures that participants receive a comprehensive intervention addressing various aspects of sleep and cognitive behavior. Each session builds on the previous one, providing a holistic approach to managing insomnia and related symptoms. The emphasis on relaxation training, cognitive therapy, and sleep hygiene practices is crucial for long-term success and relapse prevention. These findings from peer-reviewed journals reinforce the efficacy of a structured six-session CBT-I program and underline the importance of participant adherence to maximize therapeutic benefits.

Effects of CBT on sleep quality

The study demonstrated that sleep disturbances in patients were effectively managed following an 8-week CBT intervention. The therapy was administered by

three licensed clinical psychologists and one board-certified psychiatrist, emphasizing a multi-disciplinary approach. This structured CBT program was particularly effective in improving sleep quality among individuals with PTSD who experienced sleep disturbances. Research has consistently supported these findings, with several studies highlighting the positive impact of CBT on sleep quality in PTSD patients. For instance, a study from Cohen in 2023, found that an 8-week CBT program led to significant improvements in both subjective and objective sleep measures, including increased sleep efficiency and extended total sleep time, as assessed by polysomnography [25].

Additional evidence from the Sleep Medicine Reviews corroborates these findings, noting that CBT is a well-established intervention for sleep disorders associated with PTSD. The review highlights that patients receiving CBT showed substantial improvements in sleep quality, with significant reductions in insomnia symptoms and enhancements in sleep architecture [26]. The efficacy of CBT in addressing both subjective reports of sleep quality and objective measures, such as those obtained from polysomnographic assessments, underscores its role as a critical therapeutic approach for managing sleep disturbances in PTSD patients.

These results are further supported by a meta-analysis published in Behavioral Sleep Medicine, which reported that CBT for insomnia (CBT-I) significantly improved sleep outcomes in various patient populations, including those with PTSD [27]. The structured nature of the 8-week CBT program, involving multiple sessions and the expertise of qualified professionals, contributes to its effectiveness in enhancing sleep quality and managing sleep disturbances. This evidence reinforces the value of CBT as a robust and reliable treatment option for improving sleep in individuals with PTSD.

Effects of CBT on trauma injury

The study assessed the impact of Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) on patients post-TBI, administered over 12-16 sessions within a 3-4 month period. TF-CBT, delivered by trained counselors including 2 supervisors and 10 certified TF-CBT practitioners, was found to be more effective in reducing trauma and stress symptoms compared to standard care. This specific application of TF-CBT was particularly effective for orphans and vulnerable children in Lusaka, Zambia, illustrating its adaptability and efficacy in diverse settings. Research supports the effectiveness of TF-CBT in addressing trauma-related symptoms, especially in populations affected by head injuries and trauma. For instance, a study published in the Journal of Traumatic Stress demonstrated that TF-CBT significantly alleviated post-traumatic stress symptoms in children and adolescents with a history of trauma, showing notable improvements in emotional regulation and overall functioning [28].

Further evidence from Clinical Child and Family Psychology Review highlights TF-CBT's strong efficacy in treating trauma and stress symptoms among diverse populations, including those with head injuries. The review emphasizes that TF-CBT, with its structured approach involving cognitive restructuring, exposure techniques, and stress management, provides substantial benefits in reducing trauma symptoms and improving psychological outcomes [29]. The involvement of experienced supervisors and a team of trained counselors enhances the delivery and effectiveness of TF-CBT, ensuring high fidelity to the therapeutic model and maximizing its therapeutic potential.

In summary, TF-CBT has proven to be a robust intervention for mitigating trauma-related symptoms in patients with head injuries. The structured nature of the therapy, coupled with the expertise of the counseling team, underscores its effectiveness in addressing the complex needs of individuals affected by trauma and head injuries, as supported by evidence from leading journals and clinical reviews.

Effects of CBT on quality of life

The research indicates that Cognitive Behavioral Therapy (CBT) is effective in enhancing the quality of life for patients post-Traumatic Brain Injury (TBI). CBT addresses various psychological and functional challenges faced by individuals with TBI, including cognitive impairments, emotional disturbances, and social difficulties. A study published in the Journal of Neurotrauma highlights that CBT significantly improved overall quality of life in TBI patients by targeting symptoms such as depression, anxiety, and cognitive dysfunction. The therapy facilitated better adjustment to the injury and enhanced patients' ability to manage daily activities and social interactions [30].

Further evidence from the Rehabilitation Psychology journal supports these findings, showing that CBT effectively improves several domains of quality of life, including emotional well-being, cognitive functioning, and social participation. For example, a randomized controlled trial reported that patients with TBI who participated in a structured CBT program experienced significant improvements in emotional regulation and cognitive processing, which contributed to better overall life satisfaction [31]. Additionally, CBT's focus on developing coping strategies and problem-solving skills has been shown to help TBI patients adapt more effectively to their post-injury circumstances, thereby enhancing their quality of life.

These findings underscore the value of CBT as a comprehensive intervention for post-TBI patients, addressing both the psychological and practical aspects of living with a brain injury. The positive impact on quality of life, as evidenced by improvements in emotional and cognitive domains, supports the integration of CBT into

rehabilitation programs for TBI patients, offering a well-rounded approach to enhancing their overall well-being and functional outcomes.

CONCLUSION

Patients with trauma, especially post-TBI, are recommended to undergo CBT therapy, which can be conducted for 16 weeks or a minimum of 8 weeks, consisting of 3 sessions. The therapy is administered by clinical psychologists, either in person or through telephone or the Internet. CBT is effective in improving the quality of life for post-TBI patients. Additionally, in some cases, it is also effective in reducing PTSD symptoms and addressing post-trauma sleep disturbances.

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