Treatments for Post-Concussion Syndrome: A Systematic Review

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Introduction

Mild traumatic brain injury (mTBI) occurs in around 1.5 million people in the United States per year.[1] These brain injuries may result in symptoms lasting up to a year or more including headache, cognitive deficit, and metal fatigue.[2] After three months these persistent symptoms of mTBI are classified as post-concussion syndrome (PCS).[3]

It is not definitively known why people develop PCS, so looking at how to treat PCS and lessen the persistent symptoms becomes important.[2] PCS symptoms can limit and disrupt daily activities across all age groups and the symptoms are severe and frequent in most cases.[4]

There are few treatments currently available for PCS, and many patients receiving these treatments still report having symptoms.[5] These treatments include medications and psychological treatments.[5] However, the effectiveness of these treatments is disputed.[6] Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive technique in which low frequency electromagnetic fields target a desired area.[4,7] Previous studies with rTMS showed success in treating CNS disorders such as addiction,[8] stroke,[9] and depression.[10]

The purpose of this study is to explore the efficacy of rTMS and four additional treatments for PCS.[2,4,5,7,11] These treatments are, hyperbaric oxygen,[3] IV metoclopramide + diphenhydramine,[12] MLC901 (NeuroAiD II™),[13] and neuromotor retraining.[14] The findings of this study will help quantify the effectiveness of different treatments for post-concussive symptoms, and help clinicians and patients make informed treatment decisions.

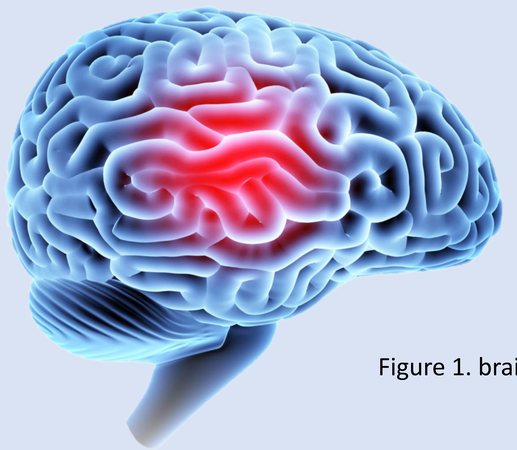

Figure 1. brain with mTBI

Methods

The sources of this systematic review were retrieved from the search engines CINAHL and PubMed in September of 2021. The search terms used in both databases were “post-concussion” AND “treatments.” Additional articles were found within the primary source’s citations after the main search. 50 results from PubMed and 17 results from CINAHL came together for 67 total articles. 58 articles were excluded due to irrelevancy, duplication between the two search engines, and lack of treatment intervention. This resulted in nine articles for data inclusion in this review.

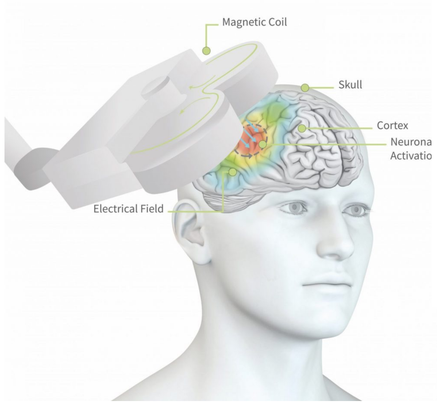

Figure 2. diagram of rTMS procedure

Figure 3. MLC901 box

Results

- Five studies explored transcranial magnetic stimulation,[2,4,5,7,11] one studied hyperbaric oxygen,[3] one examined NeuroAiD II,[13] one focused on physical therapy,[14] and one looked at metoclopramide and diphenhydramine.[12]
- Most of the studies indicated reduced symptoms resulting from the specified treatment. The metoclopramide and diphenhydramine study showed post concussive symptom relief in about 2/3 of patients.[12] The physical therapy intervention reported decreased muscle tension resulting in fewer headaches.[14] The NeuroAiD II trial showed improved cognitive function for adults.[12]
- Two transcranial magnetic stimulation studies indicated treatment aiding the pace of recovery rather than symptom reduction.[5,7] Three transcranial magnetic stimulation studies reported symptom reduction.[2,4,11]
- The hyperbaric oxygen treatment showed insignificant symptom relief.[3]

Discussion

- Studies included in this review suggest that symptoms resulting from mild to moderate traumatic brain injury can be reduced via treatments of many types.
- The hyperbaric oxygen intervention did not show beneficial outcomes in the efficacy study.[3]
- The positive outcomes of rTMS include some disputes on whether the symptoms were reduced directly from rTMS or that rTMS increased speed of recovery overall.[4,5,7]
- The broad range of study types in this review reduces bias and yields relevant results.
- The primary limitation of this study is the lack of direct comparisons of treatments and their results. This leads to a difficulty in determining the most effective treatment. This lack of comparison may stem from different primary and secondary outcomes.
- After reviewing these studies, research must continue geared toward treatments for post-concussive symptoms after mTBI. Because brain injuries are so common, to put treatment into public practice, we would need make treatment more accessible.
- While further research is necessary, physical therapy, repetitive transcranial magnetic stimulation, metoclopramide, diphenhydramine, and MLC901 are promising interventions for post-concussive symptoms.

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