

To Scrutinize the Literature on the Role of Vestibular Rehabilitation Therapy in Concussion: A Review of Empirical Evidence

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Abstract

Concussion typically results from the blow to the skull that generates abrupt acceleration and deceleration of the brain within the skull. Dizziness and imbalance may persist even after rest in concussion which may be treated by vestibular rehabilitation therapy (VRT). The intention of this review is to highlight the role of VRT by searching the literature from databases such as Google Scholar, Pubmed & Pedro. Current evidence supports the latent role of VRT in managing the persisting symptoms of concussion. Therefore, future research is needed to explore more experimental trials to strengthen its evidence.

Keywords: Mild Traumatic Brain Injury; Dizziness; Vestibular Exercise Therapy; Head Injury; Imbalance.

Introduction

The term Concussion is defined as a brain injury involving a complex pathophysiological process induced by biomechanical forces that disrupts the function of the brain [1]. According to the 'centers for disease control and prevention', Concussion is a term used in synonymous with mild traumatic brain injury (mTBI) [2]. The incidence of concussion is more in athletes, it is found through the present literature that children and adolescents are at higher risk for developing severe symptoms as compared to adults [3,4].

Dizziness, imbalance, headache and neck pain are the most prevalent symptoms after concussion & mTBI [3,5]. These symptoms may last from several minutes to months or even longer in some cases [9]. 23-81% of persons report dizziness in the initial days post concussion [8]. Persistence of symptoms like dizziness and imbalance after concussion may benefit from vestibular rehabilitation therapy (VRT)

[7]. VRT involves task specific targeted exercises which are designed to reduce dizziness and improve balance [10]. The aim of this review is to explore the literature from Google Scholar, Pubmed & Pedro to find the role of VRT in Concussion.

Vestibular Rehabilitation Therapy in Concussion

Alsalaheen et al [2] reported a retrospective study to examine the effect of VRT in reducing dizziness and improving gait & balance function after concussion. A retrospective chart review was performed of 114 patients for VRT after concussion. At the time of initial evaluation and discharge, recordings were made with self report outcome measures, dynamic gait index, gait speed and sensory organization test. The results revealed that out of 114 patients who were referred, 84 returned for at least 1 visit. In these patients, improvements were observed in all self-report, gait, and balance performance measures at the time of discharge ($P < .05$). Thus, VRT should be considered in the management of individuals post concussion who has dizziness and gait and balance dysfunction that do not resolve with rest.

Alsalaheen et al [6] again performed a retrospective chart review of 104 patients diagnosed with concussion and having complaint of persistent dizziness & imbalance. The purpose of this study was to describe the vestibular rehabilitation exercises, provided to individuals after concussion. Each of the exercises was classified by exercise type,

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duration and frequency. The results showed that Eye-head coordination exercises were the most commonly prescribed exercise type (in 95% of participants), followed by standing static balance exercises (in 88% of participants), and ambulation exercises (in 76% of participants). This study may aid the therapist in implementing their vestibular rehabilitation programmes for management of individuals with concussion.

Schneider et al [5] performed a randomized controlled trial to determine the effect of combined vestibular rehabilitation and cervical spine physiotherapy in decreasing the time until medical clearance in individuals with prolonged post concussion symptoms. Patients with persistent symptoms of dizziness, neck pain and/or headaches following a sports related concussion were randomized to the control and intervention group. Both groups received postural education, range of motion exercises, cognitive and physical rest until asymptomatic followed by a protocol of graded exertion for 8 weeks or till the time of medical clearance. The intervention group also received cervical spine and vestibular rehabilitation. In the treatment group, 73% (11/15) of the participants were medically cleared within 8 weeks of initiation of treatment, compared with 7% (1/14) in the control group. Thus, combined cervical and vestibular physiotherapy decrease time of medical clearance to return to sport in youth and young adults with persistent symptoms of dizziness, neck pain and/or headaches following a sport-related concussion.

Discussion

Trauma to the brain causes a series of neurometabolic changes that involves sudden increase in glucose metabolism as well as a decrease in cerebral blood flow which results in mismatch in homeostasis. The restoration of homeostasis may take up to 24 hours followed by a period of reduced glucose metabolism which can last up to 1 month.¹¹ Proper rest is advised during this period otherwise early exercise can worsen the mismatch of energy and possibly may lead to further damage to the brain. After adequate rest also, the persistence of symptoms like dizziness and imbalance may be due to abnormal vestibular system functioning, brain receives abnormal signals regarding the position and movement of the head in relation to space.

Due to inaccurate vestibular signals, the brain relies on the visual system and proprioceptors for maintaining the balance. Thus, excessive strain on

visual system leads to eye strain and tension headache. Simultaneously, proprioceptors fail to effectively compensate for being aware of the surface on which one is sitting or standing ultimately leads to dizziness. Therefore, VRT is very effective to treat the persistence of symptoms and also decrease the time of medical clearance of individuals to return to sports activities.

Conclusion

After studying the literature, we found there is a scarcity of evidence related to the role of VRT in concussion as there is only one prospective RCT and two retrospective studies. Thus, the intention of this review is to put the limelight on the importance of VRT to strengthen its evidence in moderate to high quality experimental trials.

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