

Vestibular Rehabilitation for Management of Sport-Related Concussion: A Critically Appraised Topic

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Focused Clinical Question: In athletes who have sustained a concussion [P], does vestibular rehabilitation (VR) [I] attenuate clinical symptoms of dizziness and balance [O] better than standard care or rest alone [C]? **Data Sources:** PubMed was searched through September 2017. Key words included iterations of vestibul*, concussion, and rehabilitation. Studies were limited to those published after 2010. Reference sections of retrieved studies were hand searched. **Study Selection:** Criteria for selection required that included studies 1) included participants who sustained a concussion and were experiencing unresolved vestibular symptoms or deficits; 2) were clinical trials or case studies, 3) utilized VR to treat concussion-related dizziness or balance deficits. **Data Extraction:** Selected outcomes of interest were 1) dizziness, as measured by the Dizziness Handicap Inventory (DHI) [25 items, 4 points each, 100 points is 'worst symptoms'], and the Numeric Pain Rating Scale for dizziness (NPRS-dizziness) [11 items, 1 point each, 10 points is 'worst symptoms']; 2) balance, as measured by the Activities-specific Balance Confidence scale (ABC) [100 points, 100 points is 'best confidence in balance']; and 3) return-to-play (RTP). Means and standard deviations were extracted for continuous data. Further, dichotomous data were presented for RTP (return, no return), DHI (no dizziness, dizziness), NPRS-dizziness (dizziness, no dizziness), and the ABC (perceived balance problems, no perceived balance problems). Relevant sample sizes from each study were also extracted. **Summary Measures:** Data regarding the effects of vestibular rehabilitation on post-concussion symptoms were analyzed utilizing 2 methods. For continuous data, Hedge's g effect sizes (ES) [95% CIs] were calculated to determine the pre-to-post treatment effects on individuals who underwent VR. For dichotomous data, risk ratios (RR) [95% CIs], relative risk increase (RRI), and numbers-needed-to-treat to benefit (NNTB) were calculated for the effect of VR vs. Standard Care for RTP, absence of dizziness, and full balance confidence. **Evidence Appraisal:** Although selection criteria allowed for non-randomized studies to be included, the PEDro scale was used to identify potential threats to validity. **Search Results:** Three studies met selection criteria. Study design varied (1 prospective, 2 retrospective) and included a randomized, controlled trial (VR vs Standard Care), a case series of patients experiencing persistent symptoms after concussion, and a retrospective account of patients who underwent VR for post-concussion symptoms. **Data Synthesis:** The effect of VR from pre-to-post testing for the reduction of dizziness and improved perception of balance was strong (pooled ES = 3.3[0.9, 5.8], $p < .006$). There was a substantial effect for VR treatment on RTP (RR = 9.5[4.0, 22.7], RRI = 8.5, NNTB = 2[2,3]); the DHI (RR = 2.9[1.2, 7.1], RRI = 1.9, NNTB = 3[2,13]); the NPRS-dizziness (RR = 3.1[0.2,47.2], RRI = 2.1, NNTB = 2[2,3]); and the ABC (RR = 1.9[0.8,4.4], RRI = 0.9, NNTB = 4[-10, 2]). **Evidence Quality:** Included studies had PEDro scale scores of 5, 6, and 8. All 3 studies failed to blind the treating therapists or outcome assessors. Two studies did not randomize participants or conceal group allocation. **Conclusion:** The evidence strongly supported the use of VR to attenuate clinical symptoms associated with dizziness and balance deficits compared

with rest alone. From a NNTB perspective, an average of ~2-3 patients would need to be treated with VR to completely dissipate vestibular symptoms in one patient. Further, individuals who experienced a complete reduction in vestibular symptoms, following VR, were 8.5 times more likely to return to sports participation compared to those who rested. It is recommended that ATs actively identify concussion patients who are experiencing persistent vestibular symptoms through the use of subjective and objective assessments of dizziness and balance. Further, ATs should be prepared to refer concussed athletes with vestibular symptoms for appropriate rehabilitation. Ultimately, future research may indicate a need for AT education to eventually include training in vestibular rehabilitation. **Word Count:** 600