

Balance Control Mechanisms in Individuals With Multiple Sclerosis in Virtual Reality Environment

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Abstract : Background: Most people with Multiple Sclerosis (MS) report worsening balance as the condition progresses. Poor balance control is also well known to be a significant risk factor for both falling and fear of falling. The increased risk of falls with disease progression thus makes balance control an essential target of gait rehabilitation amongst people with MS. Intervention programs have developed various methods to improve balance control, and accumulating evidence suggests that exercise programs may help people with MS improve their balance. Among these methods, virtual reality (VR) is growing in popularity as a balance-training technique owing to its potential benefits, including better compliance and greater user happiness. However, it is not clear if a VR environment will induce different balance control mechanisms in MS as compared to healthy individuals or traditional environments. Therefore, this study aims to examine how individuals with MS control their balance in a VR setting. Methodology: The proposed study takes an empirical approach to estimate and determine the role of balance response in persons with MS using a VR environment. It will use primary data collected through patient observations, physiological and biomechanical evaluation of balance, and data analysis. Results: The preliminary systematic review and meta-analysis indicated that there was variability in terms of the outcome assessing balance response in people with MS. The preliminary results of these assessments have the potential to provide essential indicators of the progression of MS and contribute to the individualization of treatment and evaluation of the interventions' effectiveness. The literature describes patients who have had the opportunity to experiment in VR settings and then used what they have learned in the real world, suggesting that this VR setting could be more appealing than conditional settings. The findings of the proposed study will be beneficial in estimating and determining the effect of VR on balance control in persons with MS. In previous studies, VR was shown to be an interesting approach to neurological rehabilitation, but more data are needed to support this approach in MS. Conclusions: The proposed study enables an assessment of balance and evaluations of a variety of physiological implications related to neural activity as well as biomechanical implications related to movement analysis.

Keywords : multiple sclerosis, virtual reality, postural control, balance

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