

Breaking Through Barriers on Improving Balance and Gait in Parkinson's Disease: A Systematic Review and Meta-Analysis of Virtual Reality Telerehabilitation

Introduction

Parkinson's disease (PD) is the most common neurodegenerative and movement disorder globally with prevalence increasing 155.50% in the last 20 years. While being proven beneficial, early rehabilitation has been unoptimized during the Covid-19 pandemic. Virtual reality (VR) telerehabilitation as a novel approach has been shown to be as effective as face-to-face treatment, yet there have been no systematic reviews and meta-analyses specifically assessing its efficacy in improving PD patients' balance and gait.

Objective

To investigate the efficacy of VR telerehabilitation for improving motor function, specifically balance and gait, in PD patients.

Method

A systematic review was performed based on PRISMA guideline and the literature search was conducted in PubMed, Cochrane Library, Science Direct, EBSCOHost, ProQuest, Wiley Library, and Google Scholar. A meta-analysis was conducted using RevMan 5.4 to compute the summary of mean difference (MD) and 95% confidence intervals (CI) for the Berg Balance Scale (BBS) outcome.

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Result

Nine randomized controlled trials (RCTs) with a total of 467 participants were included and evaluated for risk of bias. The pre- and post- VR intervention forest plot of BBS score depicts a significant effect without heterogeneity (MD: -4.29; 95% CI: -5.90--2.68; $p < 0.00001$; $I^2 = 0.00$). In terms of control and intervention efficacy, the forest plot of BBS score also depicts a significant effect (MD: 2.31; 95% CI: 0.41-4.21; $p = 0.02$; $I^2 = 0.23$). The overall gait function was found to be significantly better in the VR group compared to the control group.

Conclusion

PD patients with VR telerehabilitation significantly had better improvement in balance and gait. Therefore, VR can be a preferential choice of rehabilitation for PD patients, especially during this Covid-19 pandemic. However, further large-scale RCTs are still needed to ensure the applicability of VR telerehabilitation.

Key Words

virtual reality, VR, telerehabilitation, balance, gait, parkinson's disease