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TREATMENT FIDELITY OF GAZE AND POSTURAL STABILITY INTERVENTIONS TO IMPROVE BALANCE IN PATIENTS WITH MULTIPLE SCLEROSIS

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Background

There are over 2.3 million people worldwide currently living with multiple sclerosis (MS). Symptoms of MS vary and can include: muscle weakness, fatigue, loss of vision, and dizziness. Vestibular rehabilitation approaches are being used as exploratory interventions for treating dizziness and balance issues in people with MS. To quantify these approaches, inertial measurement units (IMUs) containing accelerometers and gyroscopes can be used to measure frequency, amplitude, and velocity of head movements performed during vestibular rehabilitation. This information allows for detailed monitoring and progression of patient treatment and recovery. The purpose of this intervention was to determine the feasibility of using IMUs during vestibular rehabilitation interventions, and to examine the differences in dosage (frequency, velocity and amplitude) of head movements between an experimental gaze and postural stability (GPS) group and a standard of care (SOC) group.

Methods

Ten adults with MS were randomized into either the SOC group (n = 5) or the GPS group (n = 5). Participants completed 18 visits of treatment over a seven-week period. In each session they spent 60 to 90 minutes performing group specific exercises. The SOC group performed vestibular neutral exercises spending 30 minutes on a NuStep and doing 3 sets of 20 on leg press and heel raise. The GPS group completed all of the SOC training in addition to 15 minutes performing gaze stabilization exercises and 15 minutes performing postural stability exercises. For 3 of the 18 visits (early, middle, and late), participants wore 3 tri-axial wireless IMUs on the forehead, sternum, and waist to measure frequency, velocity, and amplitude of head movements.

Results

Through the course of the intervention IMUs were found to be a feasible way to measure frequency, velocity, and amplitude of head movements performed during vestibular rehabilitation. However, Kruskal-Wallis chi squared analyses for frequency, velocity, and amplitude didn't reach significance when comparing the GPS group and the SOC group.

Conclusion and Discussion

While no variables showed significant changes, measurement of the frequency of yaw plane head movement appears feasible as shown by a trend towards improvement in the GPS group over the progression of the intervention period. Velocity, frequency, and amplitude of head movement were higher in the GPS group compared to the SOC group, however there were no significant group differences for any of the variables. The data analyses for this study were underpowered with a small sample size of participants (n = 10). Continued enrollment should improve the within group and between group effect sizes.