

WEARABLE VIBRATION THERAPY ON GAIT AND MOBILITY IN PEOPLE WITH MULTIPLE SCLEROSIS

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Background: Multiple sclerosis (MS) is among the most common causes of neurological disability in young adults affecting more than 1 million adults in US. Three of four people with MS report reduced mobility due to impaired walking function at some point during their lifetime. There is a growing array of interventions, such as medications, disease-modifying therapies, physical therapy, virtual reality, functional electrical stimulation (FES), tele-rehabilitation and robotics to improve walking. However, there is a lack of consensus on the effectiveness and efficacy of those interventions in gait performance by patients with MS, as well as the notable deleterious side effects and sustainability of the interventions.

Purpose: The purpose of this exploratory study was to determine whether 4 weeks of wearable focal muscle vibration was feasible and would improve gait and walk performance in individuals with MS.

Methods: In a single site, single group within-subjects design four MS participants applied vibration therapy at home for 4 weeks. Gait assessment using 3D motion analysis system was performed at baseline and end of 4-week intervention. Timed 25-Foot Walk test was used to assess walk at baseline, end of intervention and end of a 4-week follow-up. The Quebec User Evaluation of Satisfaction with Assistive Technology questionnaire was used to assess participant's satisfaction. Wearable vibration devices were positioned on both lower limbs on three different muscles for 10 minutes per muscle, 3 days per week for 4 weeks. Descriptive statistics were used for data analyze.

Results: Four participants completed the study to date with average age of 51.50 (SD:10.34), three females and one male, two Caucasian and two African-American. The average years with MS was 7.25 (SD: 5.80). The preliminary results showed that participants were very satisfied with the wearable device and vibration therapy. The Timed 25-Foot Walk results showed that two patients participants the test faster after the 4-week vibration intervention, and did not worsen, even after the follow-up. The self-paced walking speeds and stride length and width were improved after the intervention.

Discussions/Conclusions: 4 weeks of focal vibration delivered by a wearable vibration device improved the gait speed, stride length and width determined by 3-D motion analysis and improved the functional mobility measured by Timed 25FT Walk. However, further study is required to confirm and extend these preliminary findings and determine the potential mechanisms of action in focal vibration therapy.

Relevance to Allied Health: The findings of this project are important for all allied health professions to utilize wearable technology and vibration therapy as an intervention for gait and mobility impairment for patients with MS. The implications for this project include the use of wearable technology and vibration therapy to improve gait and mobility for other conditions, e.g., Parkinson's disease, Stroke and Spinal Cord Injuries.