

Changes in Balance, Gait and Motor Skills Following Treadmill Exercise in Adults with Parkinson's Disease

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ABSTRACT

Locomotion on an aquatic treadmill or anti-gravity treadmill may be a safe and effective alternative to exercise on a traditional land treadmill in those with Parkinson's disease as the removal of body weight in these environments may allow the participant to exercise with less concern of falling at higher speeds before reaching volitional fatigue. Purpose: To determine the training effects of three different treadmill modalities on dynamic balance, gait, and fine motor control in older adults diagnosed with Parkinson's disease. Methods: Ten adults diagnosed with Parkinson's disease (70 ± 5 years of age) completed 8 exercise sessions (4 weeks, 2x/week) each separately on a land treadmill, aquatic treadmill, and anti-gravity treadmill at 50% body weight. Two weeks separated each intervention and the order was randomized. A 4-week control period occurred at the start of the study in which no treadmill exercise was performed. Each exercise session included a 2-minute warm-up and 30 minutes at a moderate intensity. Before and after each intervention, balance, gait and fine motor control were measured. Dynamic balance and gait were assessed using a Timed-Up-and-Go test and Performance Oriented Mobility Assessment (POMA). Fine motor control was assessed with the Purdue Pegboard Test. Results: The gait assessment of the POMA was significant across all time points ($p = 0.028$). All other variables were statistically similar ($p > 0.05$) across all time points. Conclusion: Exercising on a traditional land treadmill, aquatic treadmill, or anti-gravity treadmill for 60 min/week for 4 weeks at a moderate intensity did not alter balance, gait or fine motor control in adults with Parkinson's disease.

Variable	Pre-Control	Post-Control	Post-LTM	Post-ATM	Post-AGTM
TUG (s)	8.4±1.4	9.3±3.3	8.5±2.6	7.9±2.1	8.8±3.6
POMA Balance	13.5±3.0	14.3±1.2	13.5±2.3	14.3±2.0	14.0±1.6
POMA Gait*	10.3±1.6	9.2±3.1	11.7±1.5	10.8±2.3	10.8±0.9
FMC (left hand)	8.7±3.2	9.1±2.8	9.0±3.4	8.8±2.8	9.0±3.2
FMC (right hand)	8.4±3.3	8.6±3.0	9.2±2.7	10.1±2.8	9.8±2.6
FMC (both hands)	6.1±2.4	6.6±2.7	7.3±2.9	6.8±2.2	6.2±1.9

Values are mean \pm s.d. * = main effect for time point ($p = 0.028$); ATM = aquatic treadmill; AGTM = anti-gravity treadmill; LTM = land treadmill; TUG = timed-up-and-go; POMA = performance oriented mobility assessment; FMC = fine motor control.