

Effects of 8 weeks of balance training, virtual reality training, and combined exercise on lower limb muscle strength, balance, and functional mobility among older men: a randomized controlled trial

ABSTRACT

Background: Poor muscle strength, balance, and functional mobility have predicted falls in older adults. Fall prevention guidelines recommend highly challenging balance training modes to decrease falls; however, it is unclear whether certain modes are more effective. The purpose of this study was to determine whether traditional balance training (BT), virtual reality balance training (VR), or combined exercise (MIX) relative to a waitlist control group (CON) would provoke greater improvements in strength, balance, and functional mobility as falls risk factor proxies for falls in older men. Hypothesis: We hypothesized that 8 weeks of MIX will provoke the greatest improvements in falls risk factors, followed by similar improvements after BT and VR, relative to the CON. Study design: Single-blinded randomized controlled trial NCT02778841 (ClinicalTrials.gov identifier). Level of evidence: Level 2. Methods: In total, 64 community-dwelling older men (age 71.8 ± 6.09 years) were randomly assigned into BT, VR, MIX, and CON groups and tested at baseline and at the 8-week follow-up. The training groups exercised for 40 minutes, 3 times per week, for 8 weeks. Isokinetic quadriceps and hamstrings strength on the dominant and nondominant legs were primary outcomes measured by the Biodex Isokinetic Dynamometer. Secondary outcomes included 1-legged stance on firm and foam surfaces, tandem stance, the timed-up-and-go, and gait speed. Separate one-way analyses of covariance between groups were conducted for each outcome using baseline scores as covariates. Results: (1) MIX elicited greater improvements in strength, balance, and functional mobility relative to BT, VR, and CON; (2) VR exhibited better balance and functional mobility relative to BT and CON; and (3) BT demonstrated better balance and functional mobility relative to CON. Conclusion: The moderate to large effect sizes in strength and large effect sizes for balance and functional mobility underline that MIX is an effective method to improve falls risk among older adults.

Keyword: Balance; Exercise; Exergame; Functional mobility; Muscle strength; Older adults