

Multidirectional hopping exercise improved balance and ankle plantarflexion strength in community-dwelling older men

Background: High impact exercise can increase bone density, but little is known about the functional adaptations to this type of exercise in older people. Interventions that attenuate the age-related decline in physical function may improve mobility and reduce fall risk in older people. **Objective:** This study aimed to determine the changes in balance, postural sway and muscle strength in response to brief impact exercises in older men. **Methods:** Fifty healthy community dwelling men (65-80 years) completed daily multidirectional hopping exercises at home over a 6-month period (TG) and twenty age and physical activity matched volunteers served as controls (CG). Isometric ankle plantarflexion strength, single leg stand stance time and postural sway were measured before and after the 6-month exercise programme. Stance time was compared using Wilcoxon matched pairs test and other variables by repeated measures ANOVA. **Results:** Isometric ankle plantarflexion strength increased in the TG compared to the CG (+9.5 vs. -2.6%, ANOVA interaction, $P > 0.05$). Single leg stance time (best score from 3 x 30 s trials) increased in the TG ($+2.3 \pm 1.0$ s, Wilcoxon, $P = 0.046$), but not the CG (-1.2 ± 1.3 s, Wilcoxon $P = 0.514$). The modest declines in total, anterior-posterior and medio-lateral sway amplitude in the TG over the 30 second period (-2.6%, -1.4%, -1.3%) were not significantly different from changes in the CG (+2.1%, +0.5%, +4.0%) (ANOVA interaction, $P > 0.05$). **Discussion:** The increase in ankle plantarflexion strength with brief high impact exercises was substantially greater than the magnitude of the annual age-related decline after 60 years. Improved plantarflexion strength may allow better compensation for postural sway without losing balance and therefore explain the longer duration of stance alongside maintained sway. **Conclusion:** Multidirectional hopping exercise significantly increased balance and ankle plantarflexion strength in older men. This type of exercise could help to improve physical function and mobility as well as increasing bone strength in older pe