

Abstract details

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Effects of Whole Body Vibration Training on postural control in older individuals

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Objective: Thirty percent of the community dwelling population over 65 fall each year and these falls often result in functional impairment, serious injuries or even death. Poor balance is one of the major risk factors for falls. Fortunately studies have shown that certain training paradigms (e.g. fitness training) can improve postural control even in older persons. Whole Body Vibration (WBV) training, which can be seen as an alternative for strength training with a simultaneous stimulation of the proprioceptive system, might potentially be useful to enhance balance in older individuals. However, studies regarding the effects of WBV training on postural control are scarce. Therefore it still remains unclear which aspects of postural control are most sensitive to this type of training. Assuming combined effects of muscle training and sensory stimulation in the context of WBV training, we hypothesized that one year WBV training might improve balance in older men and women.

Methods: This randomized controlled trial investigated the effects of one year WBV training on balance in community dwelling individuals over the age of 60. 220 elderly were randomly assigned to a WBV group (n=94, 66.8±0.5 years), a Fitness group (n=60, 66.8±0.6 years) and a Control group (n=66, 67.8±0.6 years). The WBV group exercised during maximum 40 minutes (squat, deep squat, lunge, ...) on a platform (Powerplate) that generates vertical sinusoidal vibrations. Balance was trained indirectly by exercising on one leg, without using the handrail and/or with the eyes closed. The Fitness group performed cardiovascular, strength, balance and stretching exercises for 1.5 hours. The Control group did not participate in any training. Balance was measured at baseline, after 6 and 12 months using dynamic computerized posturography (Smart Equitest-Neurocom). The Sensory Organization Test (SOT) measured postural control in conditions with a normal/disturbed visual surround and/or support surface and the Adaptation Test (ADT) quantified sway after toes-up and toes-down platform rotations. Data were analysed by repeated measures ANOVA and contrast analysis was used to assess between- and within-group differences. Fall frequency was analysed by the Mc Nemar test.

Results: WBV training resulted in a reduced fall frequency on a moving surface with disturbed vision (SOT) ($p < 0.05$), and in an improvement of the response to toes-down rotations (ADT) ($p < 0.001$). No effects of training were found on easier-to-perform postural tasks ($p > 0.05$). The Fitness group only improved fall frequency on a moving surface with disturbed vision (SOT) ($p < 0.05$).

Conclusion: The extensive sensory stimulation and a more efficient use of the proprioceptive feedback loop are likely to be partly responsible for the improvement in some aspects of balance of the WBV group. Further

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research is required in frail elderly more at risk of falls.

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