Effect of 6-month whole body vibration training on hip density, muscle strength, and postural control in postmenopausal women: a randomized controlled pilot study.

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Abstract

High-frequency mechanical strain seems to stimulate bone strength in animals. In this randomized controlled trial, hip BMD was measured in postmenopausal women after a 24-week whole body vibration (WBV) training program. Vibration training significantly increased BMD of the hip. These findings suggest that WBV training might be useful in the prevention of osteoporosis. INTRODUCTION: High-frequency mechanical strain has been shown to stimulate bone strength in different animal models. However, the effects of vibration exercise on the human skeleton have rarely been studied. Particularly in postmenopausal women-who are most at risk of developing osteoporosis-randomized controlled data on the safety and efficacy of vibration loading are lacking. The aim of this randomized controlled trial was to assess the musculoskeletal effects of high-frequency loading by means of whole body vibration (WBV) in postmenopausal women. MATERIALS AND METHODS: Seventy volunteers (age, 58-74 years) were randomly assigned to a whole body vibration training group (WBV, n = 25), a resistance training group (RES, n = 22), or a control group (CON, n = 23). The WBV group and the RES group trained three times weekly for 24 weeks. The WBV group performed static and dynamic knee-extensor exercises on a vibration platform (35-40 Hz, 2.28-5.09g), which mechanically loaded the bone and evoked reflexive muscle contractions. The RES group trained knee extensors by dynamic leg press and leg extension exercises, increasing from low (20 RM) to high (8 RM) resistance. The CON group did not participate in any training. Hip bone density was measured using DXA at baseline and after the 6-month intervention. Isometric and dynamic strength were measured by means of a motor-driven dynamometer. Data were analyzed by means of repeated measures ANOVA. RESULTS: No vibration-related side effects were observed. Vibration training improved isometric and dynamic muscle strength (+15% and + 16%, respectively; $p < 0.01$) and also significantly increased BMD of the hip (+0.93%, $p < 0.05$). No changes in hip BMD were observed in women participating in resistance training or age-matched controls (-0.60% and -0.62%, respectively; not significant). Serum markers of bone turnover did not change in any of the groups. CONCLUSION: These findings suggest that WBV training may be a feasible and effective way to modify well-recognized risk factors for falls and fractures in older women and support the need for further human studies.

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