

ACSM 2009: Whole-Body Vibration Improves Function After Hip Replacement Surgery

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June 3, 2009 (Seattle, Washington) — The addition of whole-body vibration to a novel 24-week rehabilitation protocol after hip replacement surgery significantly improves functional performance, compared with exercise alone, according to the results of a randomized trial presented here at the American College of Sports Medicine (ACSM) 56th Annual Meeting.

In 27 patients (average age, 68 years) 1 to 3 years post-hip-surgery, researchers from Oregon State University in Corvallis found that the 14 patients whose rehab involved whole-body vibration significantly outperformed the 13 patients who did the same exercises on a vibration platform that was not activated. The whole-body-vibration group scored a mean of 0.05% higher on the Sensory Organization Test, 39 watts higher on the Bassey Power Rigg test, and 1.99 seconds faster on the Timed Get Up and Go test; all between-group differences were statistically significant ($P < .05$).

A second set of analyses, presented separately, failed to find statistically significant differences between the 2 interventions with regard to bone mineral density, although patients in both rehab groups improved significantly, compared with 10 control patients who did no exercise. All 3 groups experienced similar changes in body composition over time. This was surprising, given that the same team's previous study (*Int J Obes [Lond]*. 2008;32:1348-1354) found that whole-body vibration improved vertebral bone mineral density and slowed fat acquisition in rats.

Because of the observed improvements in performance, lead researcher Gianni F. Maddalozzo, PhD, a senior instructor in the Department of Nutrition and Exercise Science at Oregon State, theorized that the study was statistically underpowered to detect a significant effect of whole-body vibration on bone mineral density.

"The vibration does do something. We're hypothesizing that it involves the central nervous system," Dr. Maddalozzo said when presenting the second set of findings to ACSM attendees. The first set of findings was presented in an earlier poster session.

Patients in both intervention groups exercised twice a week, for 60 to 75 minutes per session. The protocol included lower body and core exercises, such as step-ups, step-downs, Theraband-assisted abduction-adduction exercises, squats, lunges, and wall sits. Supplementary weight started at 2% of body weight and progressed over time to a maximum of 15% of body weight. In addition, each session included 11 minutes of multidirectional treadmill walking (4 minutes forward, 2 minutes facing left, 2 minutes facing right, and 3 minutes backward) at speeds ranging from 0.9 to 4.2 miles an hour.

Exercises were performed on a Pneu-Vibe vibration platform, at manufacturer-calibrated frequencies between 25 and 40 Hz and amplitudes between 4 and 6 mm. However, Dr. Maddalozzo noted that the researchers' independent measurements put the actual frequency between 21 and 32 Hz and the actual amplitude between 0.82 and 1.1 mm. Lower frequency and amplitude levels are thought to put patients, particularly the frail elderly, at lower risk for vibration-related injury.

Wendy Kohrt, PhD, professor of medicine at the University of Colorado in Denver, who moderated the scientific session in which the bone mineral density findings were presented, praised the Oregon State researchers' ingenuity in exploring therapeutic alternatives for improving outcomes in this challenging patient population.

"These novel approaches are really what we need for getting these post-hip-fracture patients walking again, not just the whole-body vibration but also the multidirectional treadmill walking," said Dr. Kohrt. "I'm looking forward to seeing more from this group."

Dr. Kohrt remained open to the possibility that adding whole-body vibration to the rehab protocol could improve bone mineral density and body composition, despite the initial findings. "You have to interpret these negative results very cautiously," she said.

The study did not receive commercial support. Dr. Maddalozzo has disclosed no relevant financial relationships.

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