The effects of whole-body vibration training in aging adults: a systematic review

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CRD summary
This review concluded that the available research on whole body vibration training in older adults was methodologically weak and should be interpreted cautiously. Some studies showed improvements in muscle performance, balance and functional mobility. Consistent improvements in hip and tibia, but not lumbar spine, bone density were found. A relatively limited search and poor reporting may limit the reliability of these cautious conclusions.

Authors' objectives
To assess the efficacy and safety of whole-body vibration as a form of exercise training in older adults.

Searching
MEDLINE (from 1950) and CINAHL (from 1982) were searched, with no language restrictions, up to December 2007. Search terms were reported. References of retrieved articles were also checked.

Study selection
Experimental or quasi-experimental studies of whole body vibration in people aged at least 60 years were eligible for inclusion. Studies were required to last for a minimum of six weeks and had to report on bone density, muscle performance, balance or functional mobility. Safety considerations were also considered relevant.

Included studies assessed rotational vibration (Galileo) or vertical vibration (Powerplate or low-magnitude). Intensities ranged from 10 to 30Hz for rotational vibration and 30 to 40Hz for vertical vibration, with between one and 14 sessions per week (most studies used three sessions per week). There was considerable variation in the duration and structure of sessions, with rotational vibration sessions lasting between four and six minutes, while vertical vibration sessions lasted between two and 40 minutes (full details were reported in the paper). Many studies used concomitant exercise interventions. Control groups received no intervention, various forms of exercise, placebo interventions, or drug therapy. Most studies enrolled people living in the community; two studies enrolled nursing home residents and one took place in post-stroke rehabilitation. Approximately half the studies only enrolled women, one enrolled only men, and the remainder were in mixed populations. Mean ages ranged from 61 to 82 years.

The authors did not state how the papers were selected for the review.

Assessment of study quality
Studies were assessed for validity using the Jadad scale, assigning up to 5 points for the criteria of randomisation, blinding and treatment of withdrawals and drop-outs. Scores of 3 or higher were considered to indicate high quality. Studies were also assigned to a level of evidence.

Two reviewers independently performed the validity assessment.

Data extraction
The authors stated that the articles were categorised by outcome by both reviewers, and that text summaries of individual studies were extracted. They did not provide further information as to how the data were extracted.

Methods of synthesis
The studies were combined in a narrative synthesis grouped by the outcomes assessed.

Results of the review
Thirteen studies were included in the review (n =722 participants). Jadad scores ranged from 0 to 5 points; five studies scored at least 3 points and could be considered high quality.
Bone density: Four of five studies showed benefit from whole body vibration; the anomalous study used the lowest intensity training, and evaluated only the lumbar spine. The four studies which showed a significant benefit did so at the hip or tibia, and none showed improvements in lumbar spine density. Some of the studies appeared to have included additional exercise not undertaken by control groups.

Mixed results were found for outcomes related to muscle performance (five studies) and balance and functional mobility (seven studies). In many cases, those studies showing the greatest treatment effect were also those with the lowest methodological quality scores.

Safety (13 studies): Six studies reported no adverse events; other studies reported minor side effects including transient itching and erythema, muscle soreness, headache, forefoot pain, groin pain, fear, and mild knee pain. Of these side effects, only transient itching and erythema and muscle soreness were reported by more than one person, with symptoms resolving within three to ten sessions. Only eight participants withdrew from the included studies for reasons related to the intervention.

Authors' conclusions
Much of the available research was methodologically weak and should be interpreted with caution. Some, but not all studies, showed similar improvements in muscle performance, balance and functional mobility compared with traditional exercise programmes. There was a consistent improvement in bone density in the hip and tibia, but not the lumbar spine. Additional studies are needed to determine safe and effective parameters for whole body vibration training in older adults.

CRD commentary
The inclusion criteria were clear. The authors searched two relevant databases, but did not report systematic attempts to identify unpublished studies. This may have increased the risk of relevant studies being omitted, or of publication bias. The lack of language restrictions reduced the risk of language bias. The authors reported using methods designed to reduce bias and error in the assessment of study validity, but not in selection of papers for the review; it was not clear whether they were employed for data extraction.

Lack of information on study design meant that it was not clear whether the use of the Jadad scale (designed for the appraisal of RCTs) was appropriate for quality assessment in all cases. The decision to adopt a narrative synthesis appeared reasonable.

The authors' cautious conclusions are reflective of the evidence. However, the relatively limited search and poor reporting of some aspects of the review process may limit their reliability.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that additional studies are required to determine safe and effective parameters for whole body vibration training in aging adults.

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