Canadian Agency for Drugs and Technologies in Health

HTA
HEALTH TECHNOLOGY INQUIRY SERVICE (HTIS)

TITLE: Vibration Platform Equipment for Osteoporosis: Clinical Effectiveness

DATE: 08 September 2008

RESEARCH QUESTION:

What is the evidence for the clinical effectiveness of vibration platform equipment for the treatment or prevention of osteoporosis?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, OVID's CINAHL, the Cochrane Library (Issue 3, 2008), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international HTA agencies, and a focused Internet search. Results include articles published between 2003 and September 2008, and are limited to English language publications only. No filters were applied to limit the retrieval by study type. Internet links are provided, where available.

RESULTS:

HTIS reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials (RCTs) and observational studies.

Six RCTs and three observational studies were identified pertaining to the evidence for the clinical effectiveness of vibration platform equipment for the treatment or prevention of osteoporosis. No relevant health technology assessments or systematic reviews were identified. Additional information that may be of interest has been included in the Appendix.

Health technology assessments
No literature identified.

Systematic reviews and meta-analyses
No literature identified.

Randomized controlled trials

1. Gusi N, Raimundo A, Leal A. Low-frequency vibratory exercise reduces the risk of bone fracture more than walking: a randomized controlled trial. *BMC Musculoskelet Disord* 2006;7:92. PubMed: PM17137514

2. Iwamoto J, Takeda T, Sato Y, Uzawa M. Effect of whole-body vibration exercise on lumbar bone mineral density, bone turnover, and chronic back pain in post-menopausal osteoporotic women treated with alendronate. *Aging Clin Exp Res* 2005;17(2):157-63. PubMed: PM15977465

3. Rubin C, Recker R, Cullen D, Ryaby J, McCabe J, McLeod K. Prevention of postmenopausal bone loss by a low-magnitude, high-frequency mechanical stimuli: a clinical trial assessing compliance, efficacy, and safety. *J Bone Miner Res* 2004;19(3):343-51. PubMed: PM15040821

4. Verschueren SM, Roelants M, Delecluse C, Swinnen S, Vanderschueren D, Boonen S. Effect of 6-month whole body vibration training on hip density, muscle strength, and postural control in postmenopausal women: a randomized controlled pilot study. *J Bone Miner Res* 2004;19(3):352-9. PubMed: PM15040822

5. Russo CR, Lauretani F, Bandinelli S, Bartali B, Cavazzini C, Guralnik JM, et al. High-frequency vibration training increases muscle power in postmenopausal women. *Arch Phys Med Rehabil* 2003;84(12):1854-7. PubMed: PM14669194

6. Torvinen S, Kannus P, Sievanen H, Jarvinen TA, Pasanen M, Kontulainen S, et al. Effect of 8-month vertical whole body vibration on bone, muscle performance, and body balance: a randomized controlled study. *J Bone Miner Res* 2003;18(5):876-84. PubMed: PM12733727

Observational studies

7. Ruan XY, Jin FY, Liu YL, Peng ZL, Sun YG. Effects of vibration therapy on bone mineral density in postmenopausal women with osteoporosis. *Chin Med J (Engl)* 2008;121(13):1155-8. PubMed: PM18710630

8. Beck BR, Kent K, Holloway L, Marcus R. Novel, high-frequency, low-strain mechanical loading for premenopausal women with low bone mass: early findings. *J Bone Miner Metab* 2006;24(6):505-7. PubMed: PM17072744

9. Gilsanz V, Wren TA, Sanchez M, Dorey F, Judex S, Rubin C. Low-level, high-frequency mechanical signals enhance musculoskeletal development of young women with low BMD. *J Bone Miner Res* 2006;21(9):1464-74. PubMed: PM16939405

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APPENDIX – FURTHER INFORMATION:

Randomized controlled trials

10. Hannan MT, Cheng DM, Green E, Swift C, Rubin CT, Kiel DP. Establishing the compliance in elderly women for use of a low level mechanical stress device in a clinical osteoporosis study. *Osteoporos Int* 2004;15(11):918-26. PubMed: PM15167985

Observational studies

11. McDonnell P, Liebschner MA, Tawackoli W, Mc Hugh PE. Vibrational testing of trabecular bone architectures using rapid prototype models. *Med Eng Phys* 2008. PubMed: PM18555727

12. Rubin C, Pope M, Fritton JC, Magnusson M, Hansson T, McLeod K. Transmissibility of 15-hertz to 35-hertz vibrations to the human hip and lumbar spine: determining the physiologic feasibility of delivering low-level anabolic mechanical stimuli to skeletal regions at greatest risk of fracture because of osteoporosis. *Spine* 2003;28(23):2621-7. PubMed: PM14652479

Review articles

13. Prisby RD, Lafage-Proust MH, Malaval L, Belli A, Vico L. Effects of whole body vibration on the skeleton and other organ systems in man and animal models: What we know and what we need to know. *Ageing Res Rev* 2008. PubMed: PM18762281

14. Cardinale M, Rittweger J. Vibration exercise makes your muscles and bones stronger: fact or fiction? *J Br Menopause Soc* 2006;12(1):12-8. PubMed: PM16513017

15. Rubin C, Judex S, Qin YX. Low-level mechanical signals and their potential as a non-pharmacological intervention for osteoporosis. *Age Ageing* 2006;35 Suppl 2:ii32-ii36. PubMed: PM16926201

Additional references

16. Dolny DG, Reyes GF. Whole body vibration exercise: training and benefits. *Curr Sports Med Rep* 2008;7(3):152-7. PubMed: PM18477873

17. Cardinale M, Pope MH. The effects of whole body vibration on humans: dangerous or advantageous? *Acta Physiol Hung* 2003;90(3):195-206. PubMed: PM14594190