The effects of tai chi on bone mineral density in postmenopausal women: a systematic review

CRD summary
This review investigated the effect of t’ai chi on bone mineral density in postmenopausal women. While the evidence demonstrated positive effects, the authors stated that the results were inconclusive and should be interpreted with caution. The authors’ conclusions reflect the evidence presented.

Authors' objectives
To examine the effects of t’ai chi on bone mineral density (BMD) in postmenopausal women.

Searching
MEDLINE, the Science Citation Index and the Cochrane Controlled Trials Register were searched, covering the period 1966 to April 2006; the keywords were provided. The Chinese Biological Medicine Database was searched for RCTs reported in Chinese. The authors also checked references from retrieved articles and personal libraries for additional studies. Abstracts from scientific meetings were excluded from the review.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), prospective cohort studies and cross-sectional studies were eligible for inclusion.

Specific interventions included in the review
Studies that examined t’ai chi were eligible for inclusion. Half of the included studies compared long-term practise (3 to 5 years) of t’ai chi with sedentary controls. Other studies compared t’ai chi with rope skipping, Mulan boxing, acupuncture, Chinese herbs and sedentary controls, and had study durations of 8 to 12 months.

Participants included in the review
Inclusion criteria for the participants were not stated explicitly, although it appears that studies which included menopausal or postmenopausal women were eligible for inclusion. Most of the studies assessed postmenopausal women; one study included men and one was conducted in menopausal women. The average age of the participants ranged from 49 to 67 years. The majority of studies included Asian women. Baseline BMD scores varied from normative to severely osteoporotic.

Outcomes assessed in the review
Studies that reported at least one outcome related to the measurement of BMD were eligible for inclusion. The included studies variously evaluated BMD of the lumbar spine, proximal femur, or distal radius and ulna using dual-energy X-ray absorptiometry, and distal tibia using peripheral quantitative computerised tomography. One study evaluated broadband ultrasound attenuation, bone formation marker (osteocalcin) and bone resorption markers (pyridinoline, deoxypyridinoline).

How were decisions on the relevance of primary studies made?
Titles and abstracts were reviewed, but the authors did not state how many reviewers performed the selection.

Assessment of study quality
Each study was assessed on the basis of the following: description of randomisation methods; clear inclusion and exclusion criteria; blinding of the outcome assessors; description of withdrawal and drop-outs, sample size estimates and justification; use of appropriate statistical analyses; details of the t’ai chi intervention; and the experience of t’ai chi instructors. The authors did not state how many reviewers performed the quality assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Methods of synthesis
How were the studies combined?
The studies were combined in a narrative.

How were differences between studies investigated?
Differences between the studies were described in the tables and text.

Results of the review
Six studies (n=425) were included: 2 RCTs (n=192), 2 non-randomised prospective parallel cohort studies (n=74) and 2 cross-sectional studies (n=159). The number of participants in individual studies ranged from 34 to 132. The methodological quality of most studies was poor; only one study appeared to be of a good quality.

All 3 studies of postmenopausal women who practised t'ai chi over long periods showed significantly higher BMD than sedentary controls. Results from another 3 studies (including the RCTs) demonstrated that women who start t'ai chi training (without previous training) had reduced rates of postmenopausal bone loss in comparison with sedentary controls. One non-randomised crossover study suggested that t'ai chi improves menopausal symptoms. No significant adverse effects were reported in any of the studies.

Authors’ conclusions
The limited evidence suggests that t'ai chi may be an effective intervention for maintaining BMD in postmenopausal women. However, the results are inconclusive given the small number of generally low-quality studies. Further methodologically sound research is required.

CRD commentary
The inclusion criteria for the intervention, study design and outcome measures were clear. The authors searched a number of databases without any language restrictions and attempted to locate Chinese language papers. Although the authors searched their personal libraries, it was not clear whether this included unpublished papers; this may have introduced the potential for publication bias. In addition, it was not stated how many reviewers were involved in the systematic review process, which may have introduced reviewer bias. The quality of the studies was assessed and this information was incorporated in the data synthesis. Details of the primary studies were reported, and differences between the studies were discussed. The studies were appropriately summarised in a narrative synthesis. Despite some methodological limitations of the review, the authors’ conclusions reflect the evidence presented.

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

Research: The authors stated that further methodologically sound research is needed to evaluate the impact of t’ai chi on BMD and fracture risk in postmenopausal women and osteoporotic men.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.