The effects of Tai Chi on fall prevention, fear of falling and balance in older people: a meta-analysis

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CRD summary
The review concluded there was insufficient evidence to conclude whether Tai Chi was effective in fall prevention, decreasing fear of falling or improving balance in healthy people over 50 years old. The authors' conclusions reflect the evidence presented, but the potential for publication and language bias and the small number of trials in the review should be borne in mind.

Authors' objectives
To evaluate the efficacy of Tai Chi on fall rate, fear of falling and balance in healthy older people.

Searching
MEDLINE, CINAHL, PsycLIT, and the Cochrane Database for Systematic Reviews were searched for articles published in English, French, German or Dutch up to January 2009; search terms were not reported. Reference lists of relevant reviews and retrieved randomised controlled trials were scanned for additional studies.

Study selection
Randomised controlled trials (RCTs) that evaluated Tai Chi for healthy participants aged 50 or older were eligible for inclusion. Trials had to report at least one outcome of falls, fear of falling and/or balance.

In included trials, Tai Chi exercise programmes were a mixture of styles and ranged from 16 to 120 hours. Included trials used non-exercise and/or exercise control interventions. Non-exercise controls included education, usual care and discussion groups. Exercise controls included balance training, resistance training, low impact exercise and walking. In most trials, non-exercise control groups were advised to continue their current level of activity and not practice Tai Chi. Most of the participants were community living; the remainder were in residential care. The mean age of participants ranged from 65 years to 85 years and included those who were active, inactive, or at high risk of falls. Most trials were conducted in the USA.

Two reviewers independently selected studies for inclusion; disagreements were resolved on consensus or recourse to a third reviewer.

Assessment of study quality
Two reviewers independently assessed quality using the Delphi criteria list. Criteria assessed included randomisation, allocation concealment, similarity of groups at baseline, specification of eligibility criteria, blinding, measurement of primary outcome, and intention-to-treat analysis. Trials that scored 5 points or more were considered to have a low risk of bias; trials rated 4 points or less were considered to have a high risk of bias. Disagreements were resolved by consensus or recourse to a third reviewer.

Data extraction
Data were extracted to calculate the incidence rate ratios (IRR) for falls and standardized mean differences (SMD) for fear of falling and balance outcomes, together with corresponding 95% confidence intervals (CIs). Where necessary, primary study authors were contacted for missing data.

One reviewer extracted data, which was checked for accuracy by a second reviewer.

Methods of synthesis
Trials were grouped by type of control. Data from individual trials were combined using a random-effects model to estimate pooled incidence rate ratio and 95% confidence intervals. The Hedges' adjusted g effect sizes (ES) were used...
to estimate pooled standardized mean differences and 95% confidence intervals. Heterogeneity was assessed using the I² statistic. It appeared that only trials considered to be at low risk of bias were included in the meta-analysis.

Sub-group analyses were also conducted for setting, intervention dose and duration of follow-up.

Results of the review
Twenty-one papers, representing 15 RCTs (n=2,708 participants; range 8 to 353), were included in the review, but only nine RCTs (n=2,203 participants), considered to be at low risk of bias, were included in the meta-analysis. Drop-out rates ranged from 2 to 55%. Post-test follow-up ranged from eight weeks to one year.

Tai Chi versus non-exercise control groups: A significant positive effect of Tai Chi was reported for fear of falling (ES 0.37, 95% CI 0.03 to 0.70; three RCTs). However when sub-group analyses were conducted, only the subgroup of high intervention dose (over 40 sessions) showed a significant effect. There were no significant differences between Tai Chi groups and non-exercise control groups for fall rates (five RCTs), although there was evidence of substantial heterogeneity (I²=68.6%). Subgroup analyses reported similar effects. There were also no significant differences between Tai Chi and control groups for static balance (four RCTs).

Tai Chi versus exercise control groups: There was a significant reduction for the Tai Chi groups compared with exercise control groups for fall rates (IRR 0.51, 95% CI 0.38 to 0.68; two RCTs) and for static balance (ES 0.47, 95% CI 0.23 to 0.72; two RCTs).

The results for dynamic balance were not combined (for both exercise and non-exercise groups) and evidence was inconclusive.

Some results of trials that could not be combined in a meta-analysis (due to between-trial differences) were also reported.

Authors’ conclusions
There was insufficient evidence available to conclude whether Tai Chi was effective in fall prevention, decreasing fear of falling or improving balance in people over 50 years.

CRD commentary
The research question was clear with appropriate inclusion criteria. Several relevant sources were searched for published studies and some attempts were made to reduce language bias. However, there may still be potential for language and publication bias in the review. The authors did not report search terms, so it is not possible to assess the suitability of the search. Appropriate methods were used to reduce reviewer error and bias within the review process.

The analysis was limited by the small number of trials at low risk of bias. There were differences between trial interventions, outcomes and populations, which limited the pooling of the data. The authors appropriately discussed the limitations of the review.

The authors’ conclusions reflect the evidence presented, but the potential for publication and language bias and the small number of trials included in the review for each outcome should be borne in mind.

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

Research: The authors stated that further research is required to determine the role of patient characteristics, including setting and activity level, dose of Tai Chi and effect maintenance on outcomes.

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