Tai chi exercise for patients with cardiovascular conditions and risk factors: a systematic review

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CRD summary
This review concluded that t’ai chi may have some benefit for people with cardiovascular disease or cardiovascular disease risk factors (in addition to conventional treatments), but that the evidence was weak and more research was needed. The evidence came from small randomised studies and non-randomised and observational studies. The conclusions were conservative and appear reasonable.

Authors' objectives
To assess the evidence from English- and Chinese-language papers on the effects of t’ai chi on people with cardiovascular disease or cardiovascular disease risk factors.

Searching
MEDLINE, EMBASE, CAB Abstracts, Alt HealthWatch, BIOSIS Previews and Science Citations Index and Social Science Citations Index were searched to October 2007. Search terms were provided. Chinese Medical Database, China Hospital Knowledge Database, China National Knowledge Infrastructure and China Traditional Chinese Medicine Database were searched to June 2005. Publications from the medical libraries of Beijing and Nanjing Universities were handsearched. Bibliographies of identified papers were checked. Only studies published in English or Chinese were eligible for inclusion.

Study selection
Studies that assessed the use of t’ai chi in people with known cardiovascular disease or with cardiovascular disease risk factors (including hypertension, dyslipidaemia and diabetes) were eligible for inclusion. Studies on people with stroke or healthy people were excluded. Randomised controlled trials (RCTs), non-randomised studies and observational studies were included.

In some included studies, participants had coronary heart disease (including post myocardial infarction and angina) or heart failure, hypertension, hyperlipidaemia, impaired glucose tolerance or diabetes; in others, there were mixed populations where some participants had cardiovascular disease (coronary heart disease, hypertension, stroke, cardiovascular disease, heart condition or arrhythmia), and others had chronic obstructive pulmonary disease (COPD), chronic bronchitis or were healthy. Participants were community dwellers, hospital rehabilitation patients or t’ai chi practitioners. Where stated, experience of t’ai chi ranged from none through six to 30 years. Mean ages ranged from 51 to 70 years. Interventions were Wu, Yang, Wu Chian Chuan, Cheng, Yang and Sun or unspecified t’ai chi, with or without Qigong. Control groups received exercise to music, walking, aerobic dance, calisthenics, Qigong, captopril (one study), support, no control, usual care or usual activity. Interventions lasted from eight weeks to three years. Reported outcomes were blood pressure, heart rate, exercise capacity, heart rate variability, blood lipids, fasting glucose, pulmonary function, cardiac haemodynamic indices, functional measures, flexibility, mood and quality of life.

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Methodological quality was assessed by two authors independently. Discrepancies were resolved by discussion.

Quality assessment was based on the methods used by Evidence Reports of the AHRQ (Agency for Healthcare Research and Quality) Evidence practice centers. Criteria were based on different items and gradings for different study designs, but were related to unbiased selection methods, sample size, description of the intervention and comparison group and so on. Studies were classified (grouped separately by study design) as A (least bias), B (some bias, but not sufficient to invalidate results) and C (significant bias that may invalidate results).
The Jadad scale was used to assess RCTs. This was modified to include a score for blinding for assessors only (rather than participants and investigators). Other scoring items related to methods of randomisation, and withdrawals/dropouts. The maximum score was 5.

Data extraction
Data were extracted by two authors independently.

Methods of synthesis
Results were presented in tables and as a narrative discussion, grouped according to diagnosis. Distinctions were made between studies of different designs. Heterogeneity between studies (including differences in study quality) was discussed in the narrative.

Results of the review
Twenty nine studies (1,652 participants) were included: nine RCTs (719 participants); 14 non-randomised studies (452 participants); and six observational studies (481 participants). Study sizes ranged from five to 207 participants; 14 studies had less than 50 participants.

Quality assessment rated five RCTs as A and two B, 10 non-randomised studies were rated B and one observational study was rated A and five were rated B. Three RCTs scored 4, three scored 3, two scored 2 and one scored 1 on the Jadad scale.

No adverse events related to t'ai chi were reported.

Studies in people with coronary disease: One RCT reported a decrease in blood pressure in the t'ai chi and aerobic exercise groups and a decrease in diastolic blood pressure only in the t'ai chi group. Resting heart rate improved and there was greater compliance with t'ai chi.

Studies in people with heart failure: Two out of three RCTs were of adequate quality. One showed an increase in exercise capacity, reduction in B-type natriuretic peptide and improvement in disease-specific quality of life compared to the control group. A second showed similar results for quality of life, but no difference in exercise tolerance. Two prospective non-randomised studies showed improvements in physiological parameters and functional capacity.

Studies that included some participants with cardiovascular disease (mixed population): Five non-randomised studies and five observational studies of varying quality reported improvements in blood pressure, resting heart rate, recovery after exercise and cardiac haemodynamics.

Studies in people with cardiovascular disease risk factors: Four RCTs reported a reduction in blood pressure with t'ai chi. One RCT and one observational study in people with hypertension reported an improvement in blood lipids and a second RCT in people with hypertension, dyslipidaemia or diabetes reported no change in blood lipids. Two RCTs reported no change in glucose metabolism with t'ai chi. One non-randomised study suggested a modest reduction in fasting glucose.

Authors' conclusions
Evidence suggested that t'ai chi may be beneficial for some people with cardiovascular disease or cardiovascular disease risk factors (in addition to conventional treatments), although literature was limited and further research was needed.

CRD commentary
The inclusion criteria for the review were clearly stated for participants and interventions; study design and outcomes were not defined. A number of relevant databases were searched. There was a discrepancy between the dates of English-language searches and Chinese-language searches. Studies in other languages were not sought. It was possible that studies were missed and language and publication biases may have affected the results of the review. The methods of data extraction and quality assessment were aimed at reducing reviewer error or bias. The methods of study selection were not described and so it was not possible to comment on these.

Study quality was assessed. The authors' decision to combine results as a narrative synthesis was appropriate given the...
differing nature of the included studies. Evidence came from studies of varying designs and the authors clearly discriminated between the type and quality of studies in the narrative. Reporting of multiple outcomes raised the potential for significant findings being found merely by chance. The results were derived from small studies of varying design and quality. The authors acknowledged this and their conclusions seemed suitably conservative.

Implications of the review for practice and research

Practice: The authors stated that t’ai chi may offer additional exercise options for people with or at risk of cardiovascular disease.

Research: The authors stated that there was a need for more rigorous research into t’ai chi for cardiovascular health. Studies should include larger sample sizes, better address the complexity and heterogeneity of the intervention, use clear reporting and have outcomes that included clinical efficacy.

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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.