The effect of t'ai chi on health outcomes in patients with chronic conditions: a systematic review
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CRD summary
This review assessed the effects of t'ai chi on patients with chronic medical conditions. The authors concluded that t'ai chi appears to have physiological and psychosocial benefits, but well-designed studies are required. Given that the studies were generally of a poor quality and methodological details of the review process were absent, the conclusions about efficacy should be treated with caution.

Authors' objectives
To assess the effects of t'ai chi on patients with chronic medical conditions.

Searching
MEDLINE (1966 to 2002), SPORTDiscus (1949 to 2000), Social Science Abstracts (1984 to 2000), HealthSTAR (1975 to 2000), PsycINFO (1887 to 2001), ERIC (1966 to 2001), AIDSLINE (1980 to 2000), Biological Abstracts (1980 to 2001), Sociological Abstracts (1963 to 2000), CINAHL (1982 to 2001) and Chinese Medical Database (1976 to 2000) were searched for studies reported in English or Chinese; the search terms were reported.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), non-randomised controlled trials (non-RCTs) and observational studies were eligible for inclusion.

Specific interventions included in the review
Studies of t'ai chi were eligible for inclusion. The included studies used different types of t'ai chi, although some provided no details. Where stated, the duration of tai chi ranged from 20 days to 35 years.

Participants included in the review
Studies of patients with chronic conditions were eligible for inclusion. The characteristics of the participants were generally not described. Where reported, the participants included older community dwellers; patients with osteoarthritis, rheumatoid arthritis, multiple sclerosis or hypertension; low-risk patients who had undergone coronary artery bypass surgery; healthy young adults; low-activity adults; children; and older people with dementia.

Outcomes assessed in the review
Studies that reported outcome data were eligible for inclusion. Reasons for the exclusion of some identified studies included the use of measures that lacked validity and had not been tested in the study population, and inadequate outcomes. The included studies assessed balance-related outcomes, falls, musculoskeletal outcomes, blood-pressure, cardiovascular and respiratory outcomes, psychological response, endocrine and immune systems-related outcomes, and other outcomes (including self-efficacy, measures of blood flow and nightmares).

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The studies were assessed for the following: a well-defined study question; explicit or appropriate eligibility criteria; proper allocation of the treatment groups; baseline comparability of the treatment groups; accounting for confounders; adequate description of the intervention and outcomes; blinded outcome assessment; valid outcome measurements and
statistical methods; adequate follow-up; reporting of the drop-out rate; and conclusions supported by findings. Two reviewers assessed validity.

Data extraction
Two reviewers extracted the data.

Methods of synthesis

How were the studies combined?
The studies were combined in a narrative, grouped by the patient's medical condition.

How were differences between studies investigated?
Differences between the studies were discussed with reference to study quality.

Results of the review

Forty-seven studies (n=2,762) were included: 9 RCTs (n=912), 23 non-RCTs (n=967) and 15 observational studies (n=883).

Methodological problems with the studies included: lack of a control group; small sample size; unclear study design; inadequate description of the study population and type of t'ai chi; lack of a blinded outcome assessment; lack of randomisation; potential selection bias; lack of control for confounding factors; lack of standardised outcome measures, lack of accounting for losses to follow-up; and unclear statistical analysis.

Balance and falls: 2 RCTs, 5 non-RCTs and 4 observational studies were identified (n=563). All 7 clinical trials (2 RCTs and 5 non-RCTs) found that 8 to 16 weeks of t'ai chi significantly improved balance, flexibility and strength, and reduced falls in older community dwellers. These results were supported by the results of the observational studies.

Musculoskeletal: 1 RCT and 3 non-RCTs were identified (n=168). The RCT (people with osteoarthritis) reported a statistically significant improvement in symptoms, self-efficacy, tension and satisfaction with health status after 12 weeks of t'ai chi. One non-RCT (people with rheumatoid arthritis) found no significant difference in disease activity between 10 weeks of t'ai chi and control, another (older community dwellers) found that t'ai chi increased muscle strength and endurance of knee extensors, while the third (people with multiple sclerosis) reported increases in some measures of function and flexibility, vitality, social functioning and mental health.

Hypertension: 2 RCTs and 2 non-RCTs were identified (n=401). All studies found that regular t'ai chi reduced the mean blood-pressure.

Cardiovascular and respiratory systems: 8 non-RCTs and 9 observational studies were identified (n=768). Seven of the non-RCTs reported an improvement in cardiorespiratory function, clinical symptoms or health fitness with t'ai chi; the remaining non-RCTs reported no difference in comparison with Wing Chun. The positive effects reported in the non-RCTs were generally supported by the results from the observational studies.

Psychological response: 3 RCTs and 3 non-RCTs were identified (n=568). Two RCTs (low activity older adults) found that t'ai chi for 16 weeks or 6 months improved measures of depression, psychological distress, well-being, life satisfaction and perceptions of health compared with control. One RCT (schoolchildren) reported a statistically significant improvement in perceived self-competence, visual-motor integration and anxiety with t'ai chi. Two non-RCTs found that t'ai chi improved mood and reduced stress and anxiety, and another (patients with dementia) found that reminiscence plus t'ai chi improved insight.

Endocrine and immune system: 1 non-RCT and 1 observational study were identified (n=158). Both studies reported a higher number of circulating T-cells in elderly people practicing t'ai chi compared with controls.

Other: 1 RCT, 1 non-RCT and 1 observational study were identified (n=163). The RCT (older adults) reported a statistically significant increase in self-efficacy with 6 months of t'ai chi. The non-RCT (young people) reported a
statistically significant decrease in nightmares with 20 days of t’ai chi. The observational study reported an increased cutaneous microcircularity function during t’ai chi exercise.

Authors’ conclusions
T’ai chi appeared to have physiological and psychosocial benefits, appeared to be safe, and helped balance control, flexibility and cardiovascular fitness in older patients with chronic medical conditions. However, the studies were generally of a poor quality and limitations prevented firm conclusions from being drawn.

CRD commentary
The review addressed a broad research question in terms of the study design, participants and outcomes. The inclusion criteria for participants (chronic medical condition) were not adhered to since at least one study with healthy people was included. Numerous databases were searched, some of which listed theses, dissertations and non-journal articles, thus reducing the potential for publication bias. Attempts were made to reduce language bias by including studies written in English and Chinese. The methods used to select studies and extract the data were not described, so it is not known whether any efforts were made to reduce errors and bias. Two reviewers assessed validity, but it was not reported whether they made their assessments independently. Validity was assessed using appropriate criteria.

The participants in the included studies were rarely described, and it was unclear whether this deficiency arose from inadequate information in the primary studies or not. Given the variability among the studies, a narrative synthesis was appropriate, and the synthesis took account of study quality. The studies were generally of a poor quality. This, along with the lack of methodological details of the review process, means that the conclusions should be treated with caution. However, the review does seem to support the authors’ conclusions about the limitations of the evidence and the need for well-designed studies.

Implications of the review for practice and research
Practice: The authors stated that there is insufficient evidence to recommend t’ai chi for patients with chronic conditions.

Research: The authors stated that there is a need for well-designed studies with defined study questions, adequate selection criteria, baseline similarity of the treatment groups, valid statistical methods, confounding factors taken into account, appropriate outcomes, and adequate follow-up.

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Other publications of related interest
This additional published commentary may also be of interest. Response to the systematic review of tai chi [correspondence]. Arch Intern Med 2004;164:2503-4.

**Indexing Status**
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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.