Review

Tai chi for rheumatoid arthritis: systematic review

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Introduction

Rheumatoid arthritis (RA) has an estimated 1 year prevalence of 0.3% to 1% worldwide [1]. It affects more than 2.9 million Europeans [2] and 2.1 million adults in the USA [3]. Successful treatment of RA requires early diagnosis and timely initiation of disease-modifying agents for limiting joint damage and functional loss [4]. Despite early detection, current treatment medications are limited in their efficacy and are frequently toxic [4]. RA patients therefore often turn towards complementary therapies, including tai chi [5-7].

Tai chi is officially supported by the Arthritis Foundation of Australia [8]. Unlike physiotherapeutic exercise, tai chi combines deep breathing and relaxation with slow and gentle movements [9]. The relaxation and deep breathing components of tai chi may exert effects that differ from those of physiotherapeutic exercise. It is claimed that tai chi is beneficial for cardio-respiratory function, balance control, flexibility and aerobic capacity, and that it improves muscular strength and reduces the risk of falls in the elderly [9].

A Cochrane review included four trials [two randomized clinical trials (RCTs) and two controlled clinical trials (CCTs)] on the effects of tai chi on RA [10]. The review suggested that tai chi does not exacerbate symptoms of RA and has some benefits on range of motion (ROM). However, that review missed several trials and contains other flaws such as inclusion of mixed intervention groups in which some patients received tai chi while others did not [11] and dance programmes incorporating only some principles of tai chi [12]. Also, recent clinical trials reported contradictory results of tai chi for treating RA [13, 14]. Hence, the aim of this systematic review is to update and critically evaluate the clinical trial evidence for the effectiveness of tai chi for patients with RA.

Methods

Data sources

Electronic databases were searched from their respective inceptions through January 2007 using the following databases: Medline, Pubmed, AMED, British Nursing Index, CINAHL, EMBASE, PsycInfo, The Cochrane Library 2007, Issue 1, the UK National Research Register and the ClinicalTrials.gov of the US National Institute of Health, the Cochrane Library 2007, Issue 1, Korean medical databases (Korean Studies Information, DBPIA, Korea Institute of Science, Technology Information, Research Information Center for Health Database, Korean Medline and National Assembly Library), Qigong and Energy Medicine Database (Qigong Institute, Melon Park, version 7.3) and Chinese databases (China Academic Journal, Century Journal Project, China Doctor/Master Dissertation Full text DB, China Proceedings Conference Full text DB). The search terms used were tai chi or tai chi chun or Korean or Chinese language terms for tai chi or adj chi or tai chi or Rheumatoid arthritis (RA). Systematic searches were conducted on Medline, Pubmed, AMED, British Nursing Index, CINAHL, EMBASE, PsycInfo, The Cochrane Library 2007, Issue 1, the UK National Research Register and ClinicalTrials.gov, Korean medical databases, Qigong and Energy Medicine Database and Chinese databases up to January 2007. Hand-searches included conference proceedings and our own files. There were no restrictions regarding the language of publication. All controlled trials of tai chi for patients with RA were considered for inclusion. Methodological quality was assessed using the Jadad score. The searches identified 45 potentially relevant studies. Two randomized clinical trials (RCTs) and three non-randomized controlled clinical trials (CCTs) met all inclusion criteria. The included RCTs reported some positive findings for tai chi on disability index, quality of life, depression and mood for RA patients. Two RCTs assessed pain outcomes and did not demonstrate effectiveness on pain reduction compared with education plus stretching exercise and usual activity control. The extent of heterogeneity in these RCTs prevented a meaningful meta-analysis. Currently there are few trials testing the effectiveness of tai chi in the management of RA. The studies that are available are of low methodological quality. Collectively this evidence is not convincing enough to suggest that tai chi is an effective treatment for RA. The value of tai chi for this indication therefore remains unproven.

Study selection

Prospective controlled clinical trials of tai chi for treating RA were included. Trials comparing tai chi with any type of control intervention were included. Any trials with tai chi as a part of a complex intervention were excluded. No language restrictions were imposed. Dissertations and abstracts were also included. Hardcopies of all articles were obtained and read in full.

Data extraction and quality assessment

All articles were read by two independent reviewers (M.S.L., M.H.P.) and data from the articles were extracted according to pre-defined criteria. The Jadad score [15] was calculated by...
assessing three criteria: description of randomization, blinding and withdrawals; the score ranges from a minimum of 0 to a maximum of 5 points. Taking into account that patients and therapist are impossible to blind to tai chi, one point was given for blinding if the outcome assessor was blinded. Discrepancies were resolved by discussion between the two reviewers (M.S.L., M.H.P.) and if needed, by seeking the opinion of the third reviewer (E.E.). The heterogeneity of studies prevented a meta-analysis.

Results
The literature search identified 45 articles. We contacted 10 tai chi associations and four tai chi experts. No additional published or unpublished trials were identified through these contacts. Forty studies were excluded (Fig. 1). Among these, two RCTs were excluded [12, 16] because it was not possible to extract data for tai chi alone. Five trials, two RCTs and three CCTs (Table 1) met the inclusion criteria and were reviewed. Two ongoing RCTs funded by NCCAM were located from ClinicalTrials.gov (at http://clinicaltrials.gov). One trial is a two-armed single-blind RCT over a 12-week treatment period that assesses the effectiveness of tai chi compared with relaxation on RA-related disability and health functioning in RA patients at the University of California, LA. Another ongoing RCT conducted at the University of California, LA, USA is investigating the effectiveness of tai chi compared with usual activity and reported data favourable to tai chi on disability index [14]. One CCT reported no improvement for the ability of daily life performance [18].

Study quality
The methodological quality of the included RCTs was low. None of the included RCTs reported details on randomization, blinding and allocation. Sufficient details of drop-outs and withdrawals were described in four of the included studies [14, 17, 19].

Outcomes
Pain. Two RCTs tested tai chi for pain in RA [14, 17]. Both suggested no significant pain reduction compared with education plus stretching exercise [14] and usual activity [17]. The heterogeneity of studies prevented a meta-analysis. One CCT, however, suggested significant pain reduction compared with usual activity control group [18].

Fatigue. One RCT assessed the effects of tai chi on fatigue [17] and showed no improvement compared with usual activity. One CCT compared tai chi with usual activity and suggested effectiveness of tai chi for fatigue [18].

Range of motion and joint functions. Two CCTs, reported in one article, tested tai chi for joint tenderness and the number of swollen joints [19]. Both trials failed to show intergroup differences for joint tenderness and the number of swollen joints compared with usual activity.

Depression and mood. One RCT tested tai chi for depression and reported significant intergroup differences compared with education plus stretching exercise [14]. Another RCT compared tai chi with usual activity and suggested improvement of mood on the Profile of Mood State inventory [17].

Functional index. One RCT compared tai chi with education plus stretching exercise and reported data favourable to tai chi on the disability index [14]. One CCT reported no improvement for the ability of daily life performance [18].

Quality of life. One RCT tested the effectiveness of tai chi on quality of life and reported intergroup differences for vitality subscale of SF36 compared with education plus stretching exercise [14].

Discussion
Only few controlled trials have tested tai chi for RA. The evidence from RCTs assessing pain reduction is not favourable for tai chi. However, some positive findings exist for the effects of tai chi on disability index, quality of life, depression and mood. One of the included trials reported several adverse events such as soreness in the knee, shoulder and lower back [19]. Overall our findings provide no convincing evidence that tai chi is beneficial for treating patients with RA.

Among the five studies we included, only two were randomized [14, 17]. Non-randomized trials are open to selection bias and likely to generate false positive results [18, 19]. The results from RCTs [14, 17] do not suggest beneficial effects for pain reduction compared with education plus exercise control (n = 20) [14] and usual activity (n = 42). One RCT suggested positive effects for depression, disability index and quality of life [14].

Considering tai chi as part of a mixed intervention, two further RCTs were identified. One RCT (n = 46) tested the effectiveness of tai chi on ROM and reported intergroup differences for ankle plantar flexion and lower extremity flexion compared with traditional exercise [12]. Another RCT (n = 218) suggested significant pain reduction and reduction of fatigue compared to an arthritis education programme [16].

No cost-effectiveness studies of tai chi for RA are available. The average direct cost of treating RA is approximately US$1503 to US$16514 per year per patient [20–22] and the total mean annual costs are approximately US$1702 to US$25211 [20, 21, 23]. Several tai chi experts estimate that 36–48 sessions (two times weekly for 24 weeks or three times weekly for 12 weeks) are required for treating RA. Each session would cost up to $20. This would amount to total direct costs of about $960. Thus the direct costs for tai chi might turn out to be competitive, but reliable data are required.

One argument for using tai chi in the management of RA is that it is safer than conventional treatment. Several adverse effects of tai chi have been reported in one trial [19], although others did not report any [14, 17, 18]. Compared to those of standard drug...
treatment, soreness in the knee, shoulder or lower back may be infrequent or even negligible. Adverse effects were not the focus of this review but the safety of tai chi is an important issue and needs to be addressed in future studies.

This systematic review has several limitations. Although strong efforts were made to retrieve all RCTs on the subject, it is conceivable that some were not found. In this review there were no restrictions in terms of publication language and a large number of different databases were searched. It is conceivable that several negative RCTs remained unpublished and thus distorted the overall picture [24–27]. Further limitations include the paucity and the often suboptimal quality of the primary data. One should note, however, that design features such as placebo or blinding are difficult to incorporate in studies of tai chi. These are factors that evidently influence both quality and the quantity of research.

In conclusion, currently there are few trials testing the effectiveness of tai chi in the management of RA. The studies that are available are of low methodological quality. Collectively this evidence is not convincing enough to suggest that tai chi is an effective treatment for RA. The value of tai chi for this indication therefore remains unproven.

### Table 1. Summary of controlled clinical studies of tai chi for treating rheumatoid arthritis

<table>
<thead>
<tr>
<th>First author (year)</th>
<th>Design, quality score, allocation concealment (randomized or allocated/analysed)</th>
<th>Intervention (regimen)</th>
<th>Control</th>
<th>Main outcomes</th>
<th>Intergroup difference</th>
<th>Authors’ conclusion</th>
</tr>
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<tbody>
<tr>
<td>Wang (2005) [14]</td>
<td>RCT, 2, NR (20/20)</td>
<td>Tai chi (60 min, twice weekly for 12 weeks, n = 10)</td>
<td>Education on nutrition and RA (40 min), plus stretching exercise (20 min) (twice weekly for 12 weeks, n = 10)</td>
<td>Pain (VAS), Disability Index, Quality of life</td>
<td>NS</td>
<td>‘Tai chi is a safe and potentially promising complementary therapy for adults with functional class I or II RA.’</td>
</tr>
<tr>
<td>Lee (2005) [17]</td>
<td>RCT, 2, NR (42/31)</td>
<td>Tai chi (60 min, once weekly for 6 weeks, n = 21)</td>
<td>Usual activity (n = 21)</td>
<td>Pain (VAS), Mood (Profile of Mood State), Fatigue</td>
<td>N.S.</td>
<td>‘Six week tai chi program can be utilized as a safe and effective nursing program to improve mood and sleep disturbance in patients with RA.’</td>
</tr>
<tr>
<td>Kirsteins (1991) [19]</td>
<td>CCT, 1, NR (47/31)</td>
<td>Tai chi (60 min, once weekly for 10 weeks, n = 25), plus home practice (20 min daily)</td>
<td>Usual activity (n = 22)</td>
<td>Joint tenderness, Functional assessment, No. swollen joints 50-foot walk</td>
<td>NS</td>
<td>‘Tai chi appears to be safe for RA patients and may serve as an alternative for their exercise therapy and part of their rehabilitation program.’</td>
</tr>
<tr>
<td>Kirsteins (1991) [19]</td>
<td>CCT, 1, NR (28/22)</td>
<td>Tai chi (60 min, twice weekly for 10 weeks, n = 18), plus home practice (20 min daily)</td>
<td>Usual activity (n = 10)</td>
<td>Joint tenderness, Functional assessment, No. swollen joints 50-foot walk</td>
<td>NS</td>
<td>‘Same as above’</td>
</tr>
<tr>
<td>Lee (2006) [18]</td>
<td>CCT, 0, NR (80/61)</td>
<td>Tai chi (50 min, once weekly for 12 weeks, n = 40)</td>
<td>Usual activity (n = 40)</td>
<td>Pain (VAS), Fatigue</td>
<td>P &lt; 0.01, P = 0.002</td>
<td>‘Both hydrotherapy and tai chi classes provide symptomatic benefit for older people with chronic hip or knee osteoarthritis.’</td>
</tr>
</tbody>
</table>

RCT, randomized clinical trial; CCT, non-randomized controlled clinical trial; NR, not reported; NS, no significant difference; VAS, visual analogue scale; RA, rheumatoid arthritis.

*Two trials from the same one paper.

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### Disclosure statement

The authors have declared no conflicts of interest.

### References

Tai chi for RA
