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in certain high-impact exercises (such as classic aerobics, strengthening exercises and impact sporting activities) [1]. Recently, American College of Rheumatology (ACR) guidelines have recommended regular physical activity rather than high-intensity exercise [2].

These promising trends in the potential utility of low-impact exercise prompted us to evaluate Tai Chi as a potential complementary therapy for patients with RA. Tai Chi is a traditional Chinese exercise that has been practised for many centuries. Significant improvements in cardiorespiratory function, balance, strength and flexibility, arthritis symptoms, and reduction of pain, stress and anxiety have been reported for a variety of patient populations [3], but the effect of Tai Chi in RA has not been well studied in randomized clinical trials. Thus, the goal of this randomized controlled trial was to conduct a preliminary study to evaluate whether 12 weeks of Tai Chi may be a safe and effective complementary therapy for patients with RA.

The study was approved by the Tufts-New England Medical Center (Tufts-NEMC)/Tufts University Human Investigation Review committee and was conducted in the General Clinical Research Center (GCRC) at Tufts-NEMC. Twenty ambulatory patients with functional class I or II RA were recruited from the outpatient rheumatology clinic at Tufts and randomly assigned to receive Tai Chi ( $n = 10$ ) or attention control ( $n = 10$ ) in twice-weekly 1-h group sessions for 12 weeks (Fig. 1). The Tai Chi programme was based on the classical Yang style [4]. The control group was provided with education on nutrition and medical information about RA for 40 min. The final 20 min consisted of stretching exercises involving the upper body, trunk and lower body, each stretch being held for 10–15 s.

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**Effect of Tai Chi in adults with rheumatoid arthritis**

SIR, Despite extensive clinical trials since 1975 suggesting that regular adequate exercise might play an important role in preventing disability and improving function in patients with rheumatoid arthritis (RA), numerous questions remain about the optimal exercise regimen for patients with RA. For example, joint damage has been observed in RA patients after participation

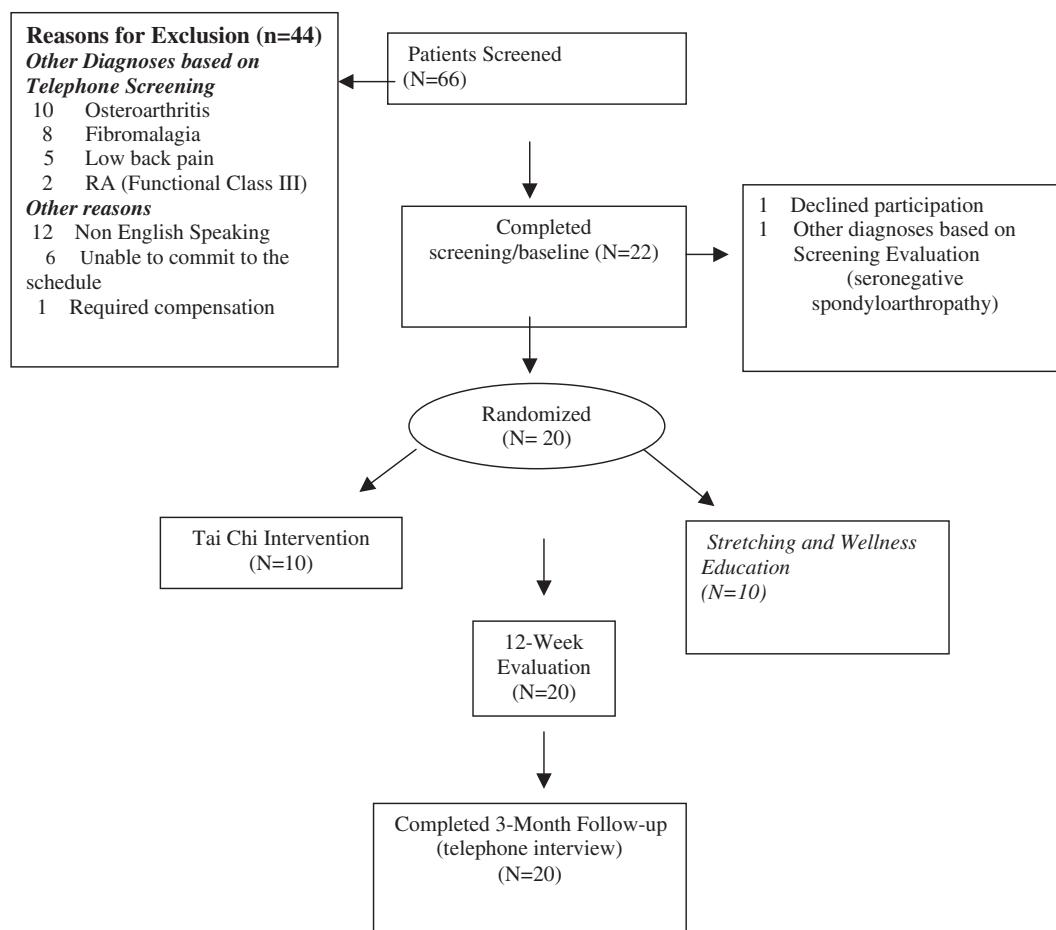


FIG. 1. Patient enrollment.

Improvement in signs and symptoms was assessed using ACR 20, functional capacity (grip strength, 50-foot walk, chair stand), health-related quality of life (the Short Form-36 and EuroQol 5D) and the Center for Epidemiology Studies Depression index (CES-D) at the baseline and at 12 weeks [5–8]. All outcomes based on physical examination (a full joint assessment for pain and swelling according to the ACR guidelines) and functional capacities were blindly assessed by the

study rheumatologist and a physiologist. The primary outcome (ACR 20) and clinical examination were compared using an intention-to-treat analysis.

At baseline, the Tai Chi group had significantly worse Health Assessment Questionnaire (HAQ) scores and C-reactive protein (CRP) but were similar in other characteristics (Table 1). At 12 weeks, 5/10 patients (50%) randomized to Tai Chi achieved an ACR20% response compared with

TABLE 1. Mean changes in disease activity, disability, health status and depression index<sup>a</sup>

	Baseline	Week 12	Change: baseline to week 12	<i>P</i> <sup>b</sup>	
				Within groups	Between groups
<i>Baseline demographic (Tai Chi/Control)</i>					
Age (yr)	48 ± 10/51 ± 17				0.57
Female	80%/70%				1.00
Hite race	80%/70%				1.00
BMI (kg/m <sup>2</sup> )	24 ± 6/28 ± 5				0.12
Weight (kg)	64 ± 16/82 ± 23				0.08
<i>Disease activity, disability</i>					
Tender joints (no.)					
Tai Chi	17.0 ± 10.2	11.7 ± 8.1	−5.3 ± 5.9	0.02	0.06
Control	10.7 ± 8.6	11.1 ± 12.3	0.4 ± 6.3	0.95	
Swollen joints (no.)					
Tai Chi	13.5 ± 10.6	12.3 ± 10.6	−1.2 ± 5.5	0.44	0.06
Control	6.7 ± 8.0	8.4 ± 9.9	1.7 ± 3.0	0.15	
Ritchie Articular Index					
Tai Chi	0.5 ± 0.4	0.3 ± 0.3	−0.2 ± 0.2	0.04	0.06
Control	0.3 ± 0.3	0.3 ± 0.4	0.04 ± 0.2	0.76	
HAQ Disability Index					
Tai Chi	0.9 ± 0.7 <sup>c</sup>	0.4 ± 0.4	−0.5 ± 0.5	0.02	0.01
Control	0.4 ± 0.3 <sup>c</sup>	0.5 ± 0.4	0.1 ± 0.3	0.57	
Pain past week, 0–3 scale <sup>d</sup>					
Tai Chi	1.4 ± 0.8	1.0 ± 0.7	−0.4 ± 0.8	0.13	0.23
Control	0.8 ± 0.5	0.9 ± 0.7	0.2 ± 0.9	0.57	
Pain (current) (10-cm VAS)					
Tai Chi	3.2 ± 2.2	2.3 ± 2.0	−1.0 ± 2.7	0.16	0.12
Control	1.4 ± 1.3	3.0 ± 2.4	1.6 ± 2.8	0.14	
Patient Global (10-cm VAS)					
Tai Chi	2.9 ± 2.4	2.4 ± 2.6	−0.5 ± 1.6	0.55	0.59
Control	2.4 ± 1.9	3.2 ± 2.8	0.7 ± 3.1	0.63	
ESR (mm/h)					
Tai Chi	35.3 ± 28.4	35.1 ± 27.6	−0.2 ± 9.1	0.98	0.56
Control	26.8 ± 14.1	30.1 ± 21.3	3.3 ± 13.3	0.55	
CRP, mg/l					
Tai Chi	1.4 ± 0.8 <sup>c</sup>	1.3 ± 1.3	−0.1 ± 1.2	0.65	0.14
Control	0.5 ± 0.4 <sup>c</sup>	0.6 ± 0.5	0.1 ± 0.3	0.15	
<i>Health-Related Quality of Life and Depression Index (scoring range)</i>					
PCS (0–50)					
Tai Chi	36.4 ± 8.8	42.8 ± 8.2	6.3 ± 9.5	0.11	0.28
Control	41.3 ± 7.1	43.2 ± 9.5	1.9 ± 6.7	0.38	
MCS (0–50)					
Tai Chi	50.5 ± 13.7	56.9 ± 5.4	6.4 ± 12.0	0.16	0.22
Control	54.8 ± 9.2	54.2 ± 9.2	−0.7 ± 8.2	0.69	
Vitality					
Tai Chi	44.5 ± 23.0	64.0 ± 15.4	19.5 ± 24.2	0.04	0.01
Control	60.5 ± 15.4	62.0 ± 16.5	1.5 ± 11.1	0.48	
CES-D					
Tai Chi	16.6 ± 3.5	14.3 ± 1.9	−2.30 ± 3.2	0.06	0.003
Control	13.0 ± 3.6	15.8 ± 4.1	2.80 ± 4.8	0.07	

<sup>a</sup>Values mean ± s.d. for continuous variables and percentages for discrete factors.

<sup>b</sup>*P*-values for continuous variables are exact values from the Wilcoxon rank sum test. *P*-values for categorical variables are from the Fisher exact test. All tests are two-sided.

<sup>c</sup>Statistically significant difference (*P* < 0.05) at baseline between Tai Chi and control group.

<sup>d</sup>The HAQ includes pain in the past week (15-cm visual analog scale that is scored 0–3).

BMI, body mass index; VAS, visual analogue scale; PCS, physical component score; MCS, mental component score; HAQ, health assessment questionnaire; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; CES-D, the Center for Epidemiology Studies Depression Index.

0/10 (0%) in the control ( $P=0.03$  in the unadjusted model and  $P=0.05$  in the adjusted model). Among the five subjects who achieved ACR20 in Tai Chi group, all had improvement in joint tenderness (20–81%), joint swelling (25–80%) and physician's global assessment of disease activity (44–80%). Four subjects had improvement in pain measurements (20–84%), HAQ score (71–100%) and CRP (36–89%). Two Tai Chi subjects had 20% improvement in almost all the variables in the ACR20 criteria even without considering the two variables (HAQ and CRP) that were not balanced between the study groups at baseline, and thus could have biased the statistical analysis.

Overall, the Tai Chi group improved in all 25 secondary outcomes, while the control group improved in only some and never by as great an amount. The Tai Chi group improved significantly more than the control group only on the HAQ disability index ( $P=0.01$ ), the vitality subscale of SF-36 ( $P=0.01$ ) and the CES-D ( $P=0.003$ ). Physical function variables (chair stand and 50-foot walk) improved in both groups (within-group comparisons,  $P<0.05$ ), but between-group comparisons were not statistically significant. No adverse events were observed. No patients withdrew from the study.

This preliminary study suggests that group Tai Chi is a safe and potentially promising complementary therapy for adults with functional class I or II RA. Furthermore, the results demonstrate that Tai Chi seems to be associated with trends to improvement in disease activity that relates to both symptoms of pain and the cognitive coping process, which in turn is related to physical and psychological disability. Our results are consistent with two non-randomized studies of Tai Chi for RA that reported that there was no significant exacerbation of joint symptoms for 10 weeks of Tai Chi [9]. It is also consistent with other Tai Chi studies in which Tai Chi had beneficial effects on tension, anxiety and depression [3].

The study was limited in that the sample size was small and the Tai Chi group appeared to have had more severe RA, as measured by higher HAQ, CRP and tender joint count at baseline and therefore may have had a greater chance for improvement in the outcome measures. The Tai Chi group also weighed less than the controls (Table 1), so we cannot exclude the possibility that Tai Chi may help joint symptoms in non-obese more than in obese individuals. In spite of these limitations, the rigour of the study design and our results warrant further investigation into the potential complementary role of Tai Chi for treatment of RA.

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### Bronchial MALT lymphoma in longstanding rheumatoid arthritis

SIR, A 64-yr-old female non-smoker with a 30-yr history of erosive RA previously treated with penicillamine, gold and sulphasalazine presented with weight loss, fatigue and night sweats. Examination revealed rheumatoid deformities without active synovitis. Investigations showed erythrocyte sedimentation rate (ESR) 130 mm/h (normal range 0–20), C-reactive protein (CRP) 115 mg/l (normal range 0–6), normochromic anaemia with haemoglobin 8.9 g/dl (normal range 11.5–16), normal biochemistry, positive rheumatoid factor but negative antinuclear antibodies, anti-Ro and anti-La antibodies; no evidence of Sjögren's syndrome (SS) on labial biopsy and sialography; very raised serum IL-6 (1316 U/l; normal range 0–50) and normal peripheral blood lymphocyte markers. Chest radiograph showed a left lower zone opacity; computed tomography (CT) revealed several left lobe masses (Fig. 1) without evidence of fibrosing alveolitis. Histology (from thoracoscopic biopsy) suggested Castleman's disease of the hyaline vascular type, a form of Castleman's disease in which only a minority of patients are symptomatic. Treatment with oral prednisolone (40 mg/day) improved the constitutional symptoms, but the inflammatory markers and IL-6 remained raised. Oral methotrexate (MTX) (15 mg/week) gave no further benefit. Ciclosporin was not tolerated. After 6 months the left lower lobe mass had enlarged. Left lower lobectomy was performed and within 2 weeks constitutional symptoms resolved and ESR, CRP and IL-6 normalized. Blood results at pre-op, and 2 weeks, 3 months, 12 months and 36 months post-op were: Hb (g/dl): 8.0, 10.1, 12.2, 12.8, 13.1; ESR (mm/h): 124, 32, 27, 29, 19; CRP (mg/l): 118, 12, <8, 11, <8; IL-6 (U/l): 1128, 62, 40, undetectable, undetectable. Histology revealed a low-grade mucosa-associated