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Comparative Effectiveness of Tai Chi Versus Physical Therapy in Treating Knee Osteoarthritis: A Randomized, Single-Blind Trial

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Background/Purpose: Knee osteoarthritis (OA) causes long-term pain and no effective treatments currently exist. Previous trials demonstrated that Tai Chi can improve both physical and mental health among patients with knee OA. However, it has not been compared against a standard of care therapy for knee OA. We designed this novel randomized, single-blind trial to test the superiority of Tai Chi compared to a standard physical therapy (PT) regimen for treatment of symptomatic and radiographic knee OA. The study was also powered to detect differences in outcomes among different Tai Chi instructors as an important secondary objective.

Methods: Adults ≥ 40 years old satisfying ACR criteria for Knee OA were randomized to 12 weeks of classical Yang style Tai Chi (2x/week) or to the standard PT regimen (2x/week for 6 weeks, followed by 6 weeks of rigorously monitored home PT). Clinical outcomes assessments were blinded to treatment allocation. The primary outcome was change in WOMAC pain subscale (0-500) at 12 weeks. Secondary outcomes included change in pain at 24 and 52 weeks as well as change in WOMAC function scores, patient global assessment (VAS, 0-10 cm), depression (Beck II, 0-63), chronic pain self-efficacy (0-10), 20 meter walk test (sec) and 6 min walk test (meters), quality of life (SF-36, 0-100), pain medication usage and comparisons of all outcomes by instructor assignment at 12, 24 and 52 weeks. We used an intent-to-treat analysis.

Results: We randomized 204 participants: 106 to Tai Chi and 98 to PT. The mean age 60 years, disease duration 8 years, BMI 33 kg/m^2; 70% were female; and 53% were white. Treatment groups did not differ in baseline characteristics, including participant expectation of treatment benefit.

At 12 weeks, WOMAC pain scores improved by 167 points (95% CI: 145, 190) in the Tai Chi group and 143 points (95% CI: 119, 167) in the PT group. There was no significant difference between groups in WOMAC pain improvement (p = 0.16). A significantly greater improvement in the Tai Chi group was found in the SF-36 Physical Component score 3.2 (95% CI: 0.8, 5.5; p=0.01) and the Beck depression score 2.7 (95% CI, 0.7, 4.8, p=0.008). No differences between groups were found for other outcomes at 12 weeks. There were no serious adverse events. Pain medication use was reduced compared to baseline at all follow-up times in both groups, but the reductions did not differ between groups. Changes in WOMAC pain did not differ among the four Tai Chi instructors (p = 0.81), though differences approached significance comparing physical therapists (p=0.05).

Conclusion: Both Tai Chi and PT led to similar improvements in pain and other outcomes for persons with symptomatic knee OA, and the benefits of Tai Chi did not differ by instructor, suggesting that standardizedTai Chi can be used as a viable therapeutic alternative to treat knee OA.

Table. Changes in Primary and Secondary Outcomes

Variables	Groups	Baseline Mean (SD)	At 12 week Change (95% CI)	95% CI and P-value for D between group
WOMAC pain (0-500)	Tai Chi PT	254.8 (95.5) 252.9 (101.9)	-167.2 (-190.4,-144.9) -143.0 (-167.4,-118.6)	-24.2 (-57.9, 9.6) P=0.16
WOMAC function (0-1700)	Tai Chi PT	912.1 (338.5) 884.7 (368.1)	-608.3 (-695.3,-521.4) -494.2 (-585.3,-403.2)	-114.1 (-240, 118) P=0.08
Patient Global (10-cm VAS)	Tai Chi PT	0.5 (0.2) 0.5 (0.2)	-0.3 (-0.3, -0.2) -0.2 (-0.3, -0.2)	-0.7 (-0.15, 0.02) P=0.06
Chronic Pain Self-Efficacy (10-cm)	Tai Chi PT	6.1 (2.0) 6.3 (2.2)	1.3 (0.8, 1.8) 0.8 (0.3, 1.4)	0.4 (-0.3, 1.2) P=0.22
20 meter walk test (sec)	Tai Chi PT	19.6 (6.3) 18.4 (3.9)	-1.6 (-2.4, -0.8) -1.1 (-2.0, -0.2)	-0.5 (-1.7, 0.7) P=0.40
6 min walk test (meters)	Tai Chi PT	391.2 (91.7) 400.1 (88.7)	28.6 (17.9, 39.2) 26.1 (14.9, 37.4)	2.5 (-13.1, 18.0) P=0.76
SF-36: PCS (0-100)	Tai Chi PT	36.5 (8.3) 36.7 (10.0)	6.3 (4.6, 7.9) 3.1 (1.4, 4.8)	3.2 (0.8, 5.5) P=0.01

SF-36: MCS (0-100)	Tai Chi PT	52.6 (9.3) 52.4 (9.2)	1.6 (-0.1, 3.2) -0.03 (-1.7, 1.7)	1.6 (-0.8, 3.9) P=0.18
Beck II Depression (0-60)	Tai Chi PT	7.8 (9.0) 7.5 (8.3)	-2.2 (-3.7, -0.9) 0.5 (-1.0, 2.0)	-2.7 (-4.8, -0.7) P=0.008

Western Ontario and McMaster Universities =WOMAC. VAS= Visual Analogue Scale; SF-36 (PCS) =Short-Form health survey (physical component summary). SF-36 (MCS) = Short-Form health survey (mental component summary) PT= Physical Therapy.

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