

Tai Chi as a treatment for knee osteoarthritis

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Several studies have reported that Tai Chi reduces joint pain and improves physical function in people with knee osteoarthritis; however, the available clinical trials are generally small and further robust studies are needed.

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Tai Chi is an ancient Chinese martial art that has been practised for centuries in China and is gaining in popularity in Western countries. Although there are many different styles (e.g. Sun, Yang, Wu, Chen), Tai Chi basically combines deep diaphragmatic breathing and relaxation with a series of postures that flow from one to the other in a slow graceful manner. Despite the many claims regarding its widespread health benefits, the biological mechanism and clinical effects of Tai Chi are not well understood.

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IS THERE ANY EVIDENCE THAT TAI CHI REDUCES PAIN AND DISABILITY IN KNEE OA?

International guidelines for the management of patients with knee osteoarthritis (OA) recommend both aerobic and strengthening exercise programs to effectively reduce joint pain and disability.¹

Evaluating the clinical benefit of Tai Chi has been hampered by the overall poor methodological quality and small sample sizes of most published studies. Furthermore, the Tai Chi programs evaluated in the various studies are heterogeneous in almost every respect, including variation in duration of programs (e.g. one-hour weekly for eight weeks up to three times per week for six months) and Tai Chi styles. It is also difficult to compare the magnitude of treatment benefit reported from various Tai Chi programs due to the diversity of control or comparator groups used.

However, a number of systematic reviews provide some evidence of the clinical benefit of Tai Chi for patients with knee OA. A systematic review of five randomised controlled trials (RCTs) concluded that there was limited evidence to suggest that Tai Chi may improve physical function and 'help in control of pain'.² Of the five RCTs reviewed, only two restricted recruitment to people with knee OA. These two RCTs reported a moderate reduction in pain compared with an attention control (consisting of three 40-minute lectures per week for six weeks) or routine treatment at an outpatient clinic. The three other RCTs recruited patients with multi-joint OA, hip OA or knee OA, and could not detect a significant reduction in pain compared with usual physical activity, hydrotherapy, wait-list control (whereby patients were allocated to a 12-week waiting period before being allocated to hydrotherapy or Tai Chi) or bingo

recreation. One possible reason for this lack of demonstrated benefit is that, compared with the knee, the hip may be less dependent on musculature for support and amelioration of forces and therefore is less likely to be responsive to a strengthening program.³

A more recent systematic review concluded that Tai Chi had a small favourable effect on pain and function: on a 0 to 100 point scale, pain improved by 10.1 points (95% confidence interval [CI], 6.3 to 13.9 points) and function improved by 9.6 points (95% CI, 5.2 to 14.0 points).⁴ The latest systematic review has reported similar conclusions.⁵ Combining the results of six studies with a total of 256 participants with knee OA, the review demonstrated that Tai Chi was associated with a significant reduction in pain and improved physical function. These six RCTs compared Tai Chi with a self-help program (consisting of one two-hour meeting per month for six months), wait-list control, attention control or routine care groups.

HOW MIGHT TAI CHI REDUCE PAIN IN KNEE OA?

It has been proposed that Tai Chi provides a strengthening effect for the quadriceps because it involves the repetition of slow, controlled movements transferring the body weight through semi-flexed knees.

Only a few studies have included knee muscle strength as an outcome when evaluating a Tai Chi program. A study of Tai Chi in healthy community dwellers has reported increases in peak torque of knee extensors and flexors from a 12-month program of Yang style Tai Chi; this one-hour program was conducted daily in a park in Taipei.⁶ Two other studies could not detect improvements in knee extensor strength after between 12 and 16 weeks of Tai Chi.^{7,8}

Although the effect on muscle strength is clearly likely to be related to program duration, it may also be related to the style of Tai Chi provided. A modified Sun style of Tai Chi, characterised by a higher stance and use of QiGong exercise to

improve relaxation and breathing, has been recommended for people with knee OA and has demonstrated efficacy in terms of improved physical function in a recent RCT.⁹ This modified Tai Chi style avoids deep knee flexion postures that can increase knee pain particularly in people with marked patella-femoral compartment OA. There may need to be a balance between deep knee flexion postures, which have greater potential for strengthening, and a higher stance, which is likely to be better tolerated in terms of pain.

A second mechanism hypothesised for the proposed benefits of Tai Chi is that it has been associated with changes in the psychosocial quality of life that may modulate chronic musculoskeletal pain. Improvements in self-efficacy and depression scores have been reported in Tai Chi studies among people with arthritis.^{10,11} These benefits were maintained at 24 and 48 weeks following a 12-week Tai Chi program.¹⁰

DOES TAI CHI REDUCE THE RISK OF FALLS FOR PEOPLE WITH KNEE OA?

Reduced muscle strength, proprioception and standing balance contribute to an increased rate of falls among older people (aged 75 years and over) with lower-limb OA.¹² A systematic review evaluating the effect of Tai Chi in patients with chronic conditions, including OA, reported that eight to 16 weeks of Tai Chi significantly improved balance and reduced the risk of falls.¹³ Another systematic review only including one RCT evaluating the effect of Tai Chi on falls risk in community living seniors (mean age 76 years) concluded that there is limited evidence that Tai Chi reduced the incidence of falls when compared with a discussion group who were provided with weekly education session for 15 weeks.¹⁴

WHICH PATIENTS ARE MOST LIKELY TO BENEFIT FROM TAI CHI?

Therapeutic exercise has been shown to be less beneficial for patients with knee OA who have marked loss of tibio-femoral joint space.¹⁵ Therefore, it is likely

that Tai Chi is also less likely to benefit this specific patient population.

Tai Chi is more likely to benefit patients who have a positive-outcome expectancy for this type of exercise, and therefore more likely to adhere for a significant period of time. Tai Chi takes time and practice before practitioners become skilled. Patients will need to be informed that they will need to persevere with a Tai Chi program in order to realise any benefits. Furthermore, benefits are not sustained without ongoing regular practice.

Tai Chi is a relatively inexpensive, accessible exercise option: it can be practised alone at home, with or without an instructional DVD, and does not require expensive equipment. On the other hand, it can be practised in a group, or in a clinical setting with a teacher, affording social and recreational benefits.

ARE THERE ANY SAFETY ISSUES ASSOCIATED WITH TAI CHI?

Although no serious adverse events have been associated with Tai Chi, patients should speak to their GP before beginning a program. Some studies report increased knee pain in a small number of patients,^{9,10} this may be minimised with correct or modified technique, starting slowly and increasing exercise intensity gradually.

CONCLUSION

Overall, due to the limited number of RCTs conducted to date, there is still uncertainty regarding the clinical effectiveness of Tai Chi in terms of reduced pain, improved physical function and reduced risk of falls in people with knee OA. However, as Tai Chi is a safe, low-impact exercise with recreational and social benefits, and is both affordable and accessible, it may be an attractive exercise option for people with knee OA. **MT**

REFERENCES

References are included in the pdf version of this article available at www.medicinetoday.com.au.

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REFERENCES

1. Zhang W, Nuki G, Moskowitz RW, et al. OARSI recommendations for the management of hip and knee osteoarthritis: part III: changes in evidence following systematic cumulative update of research published through January 2009. *Osteoarthritis Cartilage* 2010; 18: 476-499.
2. Lee MS, Pittler MH, Ernst E. Tai chi for osteoarthritis: a systematic review. *Clin Rheumatol* 2008; 27: 211-218.
3. Fransen M, McConnell S, Hernandez-Molina G, Reichenbach S. Exercise for osteoarthritis of the hip. *Cochrane Database Syst Rev* 2009; (3): CD007912.
4. Hall A, Maher C, Latimer J, Ferreira M. The effectiveness of Tai Chi for chronic musculoskeletal pain conditions: a systematic review and meta-analysis. *Arthritis Rheum* 2009; 61: 717-724.
5. Kang JW, Lee MS, Pasadzki P, Ernst E. Tai Chi for the treatment of osteoarthritis: a systematic review and meta-analysis. *BMJ Open* 2011; 1: e000035.
6. Lan C, Lai J-S, Chen S-Y, Wong M-K. 12-month Tai Chi training in the elderly: its effect on health fitness. *Med Sci Sports Exerc* 1998; 30: 345-351.
7. Song R, Lee E-O, Lam P, Bae S-C. Effects of Tai Chi exercise on pain, balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: a randomized clinical trial. *J Rheumatol* 2003; 30: 2039-2044.
8. Li JX, Xu DQ, Hong Y. Changes in muscle strength, endurance and reaction of the lower extremities with Tai Chi Intervention. *J Biomech* 2009; 42: 967-971.
9. Fransen M, Nairn L, Winstanley J, Lam P, Edmonds J. The Physical Activity for Osteoarthritis Management (PAFORM) study. A randomised controlled clinical trial evaluating hydrotherapy and Tai Chi classes. *Arthritis Rheum* 2007; 57: 407-414.
10. Wang C, Schmid CH, Hibberd PL, et al. Tai Chi is effective in treating knee osteoarthritis: a randomized controlled trial. *Arthritis Rheum* 2009; 61: 1545-1553.
11. Hartman CA, Manos TM, Winter C, Hartman DM, Li BQ, Smith JC. Effects of Tai Chi training on function and quality of life indicators in older adults with osteoarthritis. *J Am Geriatr Soc* 2000; 48: 1553-1559.
12. Sturme DL, Tiedemann A, Chapman K, Munro B, Murray SM, Lord SR. Physiological risk factors for falls in older people with lower limb arthritis. *J Rheumatol* 2004; 31: 2272-2279.
13. Wang C, Collet JP, Lau J. The effect of Tai Chi on health outcomes in patients with chronic conditions. *Arch Intern Med* 2004; 164: 493-501.
14. Verhagen AP, Immink M, Van der Meulen A, Bierma-Zeinstra SMA. The efficacy of Tai Chi Chuan in older adults: a systematic review. *Fam Pract* 2004; 21: 107-113.
15. Fransen M, Crosbie J, Edmonds J. Physical therapy is effective for patients with osteoarthritis of the knee: a randomized controlled clinical trial. *J Rheumatol* 2001; 28: 156-164.