Tai Chi reduces pain and improves physical function for people with knee OA

Synopsis


Question: What is the effect of Tai Chi for people with osteoarthritis (OA) of the knee? Design: Randomised, controlled trial with concealed allocation, blinded outcome assessment and intention-to-treat analysis. Setting: An urban tertiary academic hospital in the USA. Participants: Men and women ≥ 55 years, with body mass index ≤ 40 kg/m², Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain subscale score > 40mm, knee OA as defined by the American College of Rheumatology, and grade 2, 3, or 4 radiographic severity on the Kellgren-Lawrence classification. Prior Tai Chi training, recent intra-articular steroid or hyaluronate injections, and reconstructive surgery on the knee were exclusion criteria. Randomisation of 40 participants allotted 20 to the Tai Chi group and 20 to an attention control group. Interventions: Both groups participated in 60-minute sessions twice weekly for 12 weeks. The Tai Chi sessions included self-massage, movement, breathing technique, and relaxation. The participants were instructed to practise Tai Chi at least 20 minutes per day at home in the intervention period, and to continue this practice after the intervention period. The control group sessions included 40 minutes of didactic lessons with nutrition and medical information and 20 minutes of stretching exercises. Participants were instructed to practise at least 20 minutes of stretching exercises per day at home. Outcome measures: The primary outcome was change in the WOMAC pain subscale (range 0–500) at 12 weeks follow up. Secondary outcomes were WOMAC function subscale (0–1700), WOMAC stiffness subscale (0–200) assessed at 12, 24, and 48 weeks follow-up, and weekly WOMAC pain scores during the 12-week intervention period and at 24, and 48 weeks follow-up. Additional measures included patient and physician global assessment, physical performance tests, and psychological measures of health-related quality of life, depression, and self-efficacy. Results: All 40 participants completed the study. At 12 weeks, the mean reduction in WOMAC pain rating in the Tai Chi group was 119 mm greater than the control group (95% CI 54 to 184). Tai Chi also significantly improved WOMAC function, by 325 mm (95% CI 135 to 514), but not WOMAC stiffness. Other significantly better outcomes at 12 weeks were the global assessments, chair stand time, and most psychological measures. The benefits in WOMAC pain and function persisted to 24 weeks, and the benefits in psychological measures persisted to 48 weeks. Conclusion: For people with knee OA, Tai Chi reduces pain and improves physical and psychological function.

Commentary

Osteoarthritis (OA) refers to a clinical syndrome of joint pain accompanied by varying degrees of functional disability and impaired quality of life. The prevalence increases with age, and OA is one of the leading causes of pain and disability for the adult population worldwide (NICE 2008).

Tai Chi is a form of exercise that focuses on controlled movements combined with diaphragmatic breathing and relaxation while maintaining good posture (Hall et al 2009). This randomised controlled trial included modified Yang-style Tai Chi so as to be suitable for persons with knee pain. Previous studies of Tai Chi for this patient group have not shown convincing evidence, as the quality and quantity of the studies have been limited (Lee et al 2008, Hall et al 2009).

The trial is very well designed and reported; impressively, there is no attrition, high intervention attendance, and a long follow-up. The authors acknowledge that the trial was underpowered with only 40 participants, which resulted in fairly imprecise effect sizes. The trial showed promising results with benefits in physical function, pain, and psychological measures. As expected, the effects on pain and function started declining when treatment sessions ended. However, benefits in psychological measures persisted as far as 48 weeks. The study should be replicated on a larger scale in order to confirm the results.

Current guidelines consider non-pharmacological treatment modalities as the cornerstones in modern management of OA with information, exercise, and weight loss as core treatments (NICE 2008). Although this trial involved instruction by a Tai Chi master and selected participants, the study results might encourage physiotherapists to consider Tai Chi as an alternative, or additional, form of exercise for persons with knee OA.

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References


Supervised exercises are more effective for subacromial pain than extracorporeal shockwave treatment


Question: Do supervised exercises improve shoulder pain and disability more than radial extracorporeal shockwave treatment in patients with subacromial impingement of the shoulder? Design: Randomised, controlled trial with concealed allocation and blinded outcome assessment. Setting: An outpatient clinic in Norway. Participants: Adults with shoulder pain for at least 3 months and with clinical signs of subacromial impingement were included. Key exclusion criteria included previous shoulder surgery, shoulder instability, and rheumatoid arthritis. Randomisation allocated 52 patients to supervised exercises and 52 patients to radial extracorporeal shockwave therapy. Interventions: The exercise group participated in two 45-minute sessions each week for up to 12 weeks. The exercise sessions were supervised by a physiotherapist and emphasised reducing subacromial stress (including the use of manual techniques), relearning normal movement patterns, and progressing to loaded rotator cuff endurance training. The comparison group received radial extracorporeal shockwave treatment administered to 3–5 tender points once a week for 4–6 weeks. Outcome measures: The primary outcome was the difference in shoulder pain and disability at 6, 12, and 18 weeks. It was measured with the shoulder pain and disability index (SPADI)-a self-report questionnaire with scores ranging from 0 to 100; higher scores indicate worse shoulder pain and disability. Secondary outcome measures included pain intensity during rest and activity, specific questions about shoulder function, and work status. Results: One hundred participants completed the study. The median number of treatments were 14 in the exercise group and 5 in the comparison group. The treatment effect significantly favoured the exercise group at 6, 12, and 18 weeks, with a difference of –8 units on the SPADI (95% CI –16 to –1) at 18 weeks. At 18 weeks a higher proportion of the exercise group improved by at least the smallest detectable amount (19.6 units) on the SPADI (NNT 4, 95% CI 2 to 12). At 18 weeks a higher proportion of the exercise group had returned to work (NNT 4, 95% CI 2 to 19). The groups did not differ significantly on the remaining secondary outcomes. Conclusion: A physiotherapy program emphasising supervised exercises was more effective than extracorporeal shockwave treatment in reducing pain and disability in patients with subacromial pain in the shoulder. [NNTs calculated by the CAP Editor.]

Commentary

This single blind randomised study suggests that supervised exercises combined with some manual therapy techniques for shoulder pain (Bohmer et al 1998, Baltaci 2003) are superior to extracorporeal shockwave treatment for decreasing shoulder pain and disability.

There is recent evidence that extracorporeal shockwave treatment when compared to sham treatment can be effective in reducing pain and restoring function for patients with calcific tendinitis with negligible complications (Hsu et al 2008). One possible limitation of the Engebretsen et al (2009) trial is that we do not know what proportion of their participants had the diagnosis of calcific tendinitis; the participants who would be expected to be most responsive to shockwave therapy. However, the trial did include similar numbers of participants in both groups with symptoms of greater than 6 months, which has been associated with the development of calcific tendinitis (Green et al 1998).

Although the authors emphasised the supervised exercise component of their intervention, the manual therapy component was not well described. There is other evidence supporting the combined use of manual therapy and exercise in the treatment of shoulder impingement syndrome (Surenkok et al 2009, Senbursa et al 2007). Because patients need support on how to deal with pain and dysfunction in the early rehabilitation phase, scapular mobilisation is a useful manual therapy technique to apply to patients to gain an initial improvement in shoulder range of motion and function (Surenkok et al 2009). In a randomised clinical trial by Senbursa et al (2007), patients treated with manual physical therapy applied by experienced physical therapists combined with supervised exercise showed improvement including increasing strength, decreasing pain, and improving function compared to treatment with an exercise program alone.

Based on the positive results of the Engebretsen trial and other recent literature, future research should attempt to discern the relative contributions of manual therapy and supervised exercises to improvements in patients presenting with shoulder pain.

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References

The Canadian C-spine rule safely reduces imaging rates for cervical spine injuries

Synopsis


Question: Does implementation of the Canadian C-spine rule in emergency departments reduce the proportion of patients referred for diagnostic imaging of the cervical spine without a concurrent increase in unidentified cervical spine injuries or serious adverse outcomes? Design: Matched pair cluster randomised trial. Setting: 12 emergency departments of teaching and community hospitals in Canada. Participants: 11 824 patients with a Glasgow Coma Scale score of 15, normal vital signs, and who had sustained within the previous 48 hours either blunt trauma to the head or neck, or a visible injury above the clavicles and a mechanism of injury that was considered dangerous. Patients were excluded if they were under the age of 16, had a penetrating trauma, acute paralysis or known vertebral disease, or were a return patient for reassessment of injury. Randomisation of 11 824 participants allotted 6895 to the intervention group and 4929 to a control group. Interventions: The Canadian C-spine rule was implemented in the 6 intervention group hospital sites using three strategies: (1) policy agreement among physicians on ordering cervical spine imaging, (2) education initiatives including distribution of manuscripts, pocket card, and poster descriptions of the rule, and a 1-hour teaching session, and (3) a mandatory real-time reminder at the point of requisition for imaging. The control group received no intervention although the rule may have been familiar to some clinicians at these sites. Outcome measures: The primary outcome was the proportion of patients referred for diagnostic imaging of the cervical spine. Baseline ordering rates were measured for 12 months. During the following 12-month period, the three strategies were implemented and imaging rates monitored. Secondary outcomes were the numbers of clinically important cervical spine injuries not identified, serious adverse outcomes and misinterpretations of the rule. Results: 11 824 participants completed the study. From the baseline to implementation periods, the intervention group showed a relative reduction in cervical spine imaging of 13% (95% CI 9 to 16). This differed significantly from the control group, which showed a relative increase of 12% (95% CI 7 to 18). No patient discharged without imaging was subsequently found to have a clinically important cervical spine injury. No serious adverse outcomes occurred. Doctors interpreted the rule accurately for 83% of patients. Conclusion: Imaging rates for cervical spine injuries were reduced significantly in hospitals that implemented the Canadian C-spine rule compared with control hospitals. No cervical spine fractures were missed and no adverse events occurred.

Commentary

A large number of patients in the Western world are treated for possible injuries of the cervical spine. The results of this study suggest that the Canadian C-spine rule has the potential to affect healthcare costs considerably.

The Ottawa group have previously examined the acceptability of the Canadian C-spine rule to clinicians (Brehaut et al 2009). To do this, the rule was rated using the Ottawa Acceptability of Decision Rules Instrument (OADRI), which ranges from 0 (least acceptable) to 6 (most acceptable). Emergency physicians in Australia, Canada, USA, and UK rated the Canadian C-spine rule between 4 and 5 on the OADRI, suggesting good acceptability. Vaillancourt et al (2009) found 100% sensitivity and 38% specificity of the Canadian C-spine rule when used by paramedics. It would be worthwhile repeating these studies with Emergency Department physiotherapists to add to the growing body of evidence to guide this arm of the profession (Jibuike et al 2003, McClellan et al 2006, Webb 2008).

The participating centres were 6 teaching and 6 community hospitals. Surprisingly, the effect of implementation of the Canadian C-spine rule was less in academic centres than in community hospitals. Several of the academic centres had participated in an earlier validation study of the rule, which may have increased their baseline use of the rule.

The procedures to introduce the rule to the active hospitals in this trial were extensive. Given this and the relatively low cost of diagnostic radiography the study could have benefited from a cost effectiveness analysis. Nevertheless, this excellent study shows the efficacy and importance of clinical decision making rules. The authors are to be congratulated on the study.

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References

Breathing training improves subjective health status but not pathophysiology in asthmatic adults

Synopsis


Question: Does breathing training improve respiratory symptoms, quality of life and objective markers of disease severity in adults with asthma? Design: Randomised controlled trial. Setting: Ten general practitioner (GP) practices in Leicester, UK. Participants: Adults treated for asthma in a GP practice with moderate impairment of asthma-related health status, defined as a score less than 3.5 on the Asthma Quality of Life Questionnaire (AQLQ). Smokers were excluded. Randomisation of 183 participants allotted 94 to breathing training and 89 to a control group. Interventions: Usual physicians for both groups were requested to continue baseline therapy if possible. All participants were invited to 3 sessions within one month: an initial 60-min session with 2–4 participants, followed by two individual sessions of 30–45 minutes. At these sessions, the intervention group were educated about abnormal breathing patterns and taught appropriate regular diaphragmatic and nasal breathing techniques and encouraged to practise these exercises for at least 10 min each day. At the control group’s sessions, an asthma nurse provided information on the nature of asthma, atopy concepts, and treatment rationale, without providing personalised asthma advice. Outcomes: Assessments were undertaken at baseline, post-treatment and at 6 months. The primary outcome measure was the AQLQ. Secondary outcome measures were the Asthma Control Questionnaire (ACQ), the Nijmegen hyperventilation questionnaire (NQ), the Hospital Anxiety and Depression Scale (HADS), lung function, bronchial hyper-responsiveness and reversibility, resting minute volume and end-tidal carbon dioxide, inflammatory markers, exhaled nitric oxide, and corticosteroid use. Results: Although both groups improved substantially by 1 month on the AQLQ, most of the other questionnaires, lung function and minute volume, there were no significant between-group differences. However, by 6 months, the intervention group had significantly better scores than the control group on the total AQLQ score by 0.4 (95% CI 0.1 to 0.7) and on the AQLQ Symptoms, Activities, and Emotions subdomains. Also at 6 months, the intervention group was significantly better than the control group on the HADS Anxiety score by 1.0 (95% CI 0.2 to 1.9), the HADS Depression score by 0.7 (95% CI 0.1 to 1.3), and the NQ score by 3.2 (95% CI 1.0 to 5.3). None of the other outcomes differed significantly between groups at any time. Conclusion: Breathing training improves asthma-specific subjective health status but does not influence the pathophysiology of the disease.

Commentary

In 2004, the Cochrane review of breathing training for asthma (Holloway and Ram) was largely inconclusive due to inconsistent results between studies. Since then, this study and several others that would be eligible for inclusion in that review have been published (Holloway and West 2007, Slader et al 2006, Thomas et al 2009). Among all the relevant trials, there is still no consistent evidence that breathing training improves objective measures of disease severity. By contrast, almost all the trials have identified an improvement in outcomes reflecting the influence of symptoms on quality of life or a reduction in medication requirements. Where such benefits have not been identified, strong trends have occurred in underpowered trials. This suggests that the next version of the Cochrane review is likely to reach the same conclusion as this study: breathing training improves asthma-specific health status and other patient-centred measures in patients whose quality of life is impaired by asthma, despite not having a clinically marked effect on the underlying pathophysiology.

This trial has overcome some of the criticisms levelled at other trials in this area, such as the lack of comparable clinical contact to control for the individual attention received by participants in the intervention group, unsophisticated measures of inflammation, and inadequate statistical power (Bruton 2008, Holloway and Ram 2004). Despite the relatively high pre-intervention drop-out rate (12%) this trial achieved reasonable group numbers. However, it still has some minor limitations: reliance on documentation of a diagnosis of asthma in medical records with no confirmatory assessment, and lack of blinding of most of the parties involved. However, the study did blind the data analysts, for whom blinding has only recently been recommended (Kolahi and Abrishami 2009).

The benefits of breathing training in asthma appear clinically worthwhile despite the probable absence of an effect on the underlying pathophysiology. Physiotherapists should consider using this intervention in appropriate patients.

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References
Exercises supervised by physiotherapists improve pain and function in patients with patellofemoral pain

Synopsis


Question: Does supervised exercise therapy improve pain, function, and recovery more than usual care for patients with patellofemoral pain syndrome? Design: Randomised controlled trial with concealed allocation. Setting: General and sports medicine practices in The Netherlands. Patients: Patients aged 14 to 40 with patellofemoral pain for between 2 months and 2 years were recruited as they consulted a general practitioner or sports physician for the pain. Knee osteoarthritis, patellar tendinopathy, and Osgood-Schlatter disease were exclusion criteria. 131 patients were randomised into exercise therapy (n = 65) and control (n = 66) groups with stratification by age and recruiting physician. Interventions: The intervention group received a 6-week progressive exercise program that was individually tailored. This group was instructed to exercise 25 minutes daily for 3 months and was supervised by a physiotherapist for 9 sessions over 6 weeks. The control group was advised to rest during periods of pain and to refrain from pain-provoking activities. Both groups received written information and advice about their condition, appropriate analgesia, and activity guidelines and daily isometric quadriceps exercises. Outcomes: Primary outcomes measured at 3 and 12 months were perceived recovery (7-point Likert scale), function (0–100 point Kujala patellofemoral score), and pain at rest and with activity (0–10 point numerical rating scale). Results: After 3 months, the exercise group had less pain at rest (–1.1, 95% CI –1.9 to –0.2), less pain on activity (–1.0, 95% CI –1.9 to –0.1), and improved function (4.9, 95% CI 0.1 to 9.7), compared with usual care. At 12 months the exercise group had less pain at rest (–1.3, 95% CI –2.2 to –0.4), less pain on activity (–1.2, 95% CI –2.2 to –0.2), and improved function (4.5, 95% CI –0.7 to 9.8). A higher proportion of patients in the exercise group than in the control group reported recovery (42% v 35% at 3 months and 62% v 51% at 12 months), although the differences were not statistically significant. Conclusion: Exercise therapy, supervised by a physiotherapist, results in both short- and long-term benefits in pain and function for patients with patellofemoral pain syndrome, compared with usual care.

Commentary

Despite considerable international research effort devoted to understanding the causes of and optimum treatments for patellofemoral pain (PFP), a full understanding of the condition has remained elusive. Grelsamer and Moss (2009) recently referred to patellofemoral pain syndrome as ‘the Loch Ness Monster of the knee.’ Set against this background the paper by van Linschoten and colleagues is most welcome. It is one of the largest randomised controlled trials performed on this group of patients to date. It is also one of the most methodologically robust, scoring 7/10 on the PEDro scale (de Morton 2009), and as such helps to inform clinical practice.

The outcome measures used have previously been validated and are focused on patients’ self report rather than clinician observation. The study was carried out using a representative PFP population in a primary care setting with no specialist diagnostic or treatment tools and therefore the results should be replicable by physiotherapists in a wide variety of clinical practice locations and health care systems.

As is the case in a number of musculoskeletal studies, positive effects in the intervention and control groups were recorded at 3 months with further improvements at 12 months. Differences between the physiotherapy exercise and control group were more marked at 3 months than at 12 months. Foster et al (2009) highlight this issue with reference to back pain where high quality trials have shown a similar pattern of improvement, with only small differences between interventions at follow up. One of the explanations for this is inadequate identification of clinically important sub-groups of patients which may mask responses to treatment. This sub-grouping issue is also relevant in PFP.

The key clinical message is that this paper demonstrates clear patient benefit at 3 and 12 months following a schedule of 9 supervised physiotherapy exercise sessions delivered over a 6-week period.

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References