Chronic tendinopathy: effectiveness of eccentric exercise
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CRD summary
To review assessed the effectiveness of eccentric exercise programmes in the treatment of common tendinopathies. The authors found a lack of high-quality evidence to support the effectiveness of eccentric exercise in comparison with other treatments for relieving pain and improving function or patient satisfaction. The conclusions are likely to be reliable.

Authors' objectives
To assess the effectiveness of eccentric exercise (EE) programmes in the treatment of common tendinopathies.

Searching
MEDLINE, CINAHL, AMED, EMBASE, the Cochrane Database of Systematic Reviews, ACP Journal Club, DARE, the Cochrane Controlled Trials Register and PEDro were searched. The search dates covered 1966 to January 2006 and the keywords were reported. In addition, three sports medicine journals were handsearched (covering the dates 1995 to January 2006) and the reference lists of relevant articles were checked for additional studies. Studies in any language were eligible for inclusion.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies that used EE were eligible for inclusion. Studies with cointerventions were eligible for inclusion as long as the interventions were standardised. Studies that compared two types of EE without a control group were excluded from the review. The included studies evaluated drop-squats, exercises on decline board, or resistance band exercises, and the programmes lasted from 4 to 12 weeks. The comparison groups included concentric exercise (CE), stretching, sham or true ultrasound, and counselling, frictions, splinting or normal training.

Participants included in the review
Studies of participants with a clinical diagnosis of tendinopathy of the Achilles tendon, patella tendon, common wrist extensor tendon origin, or rotator cuff tendons were eligible for inclusion, except if they had previously ruptured or undergone surgery of these tendons. Studies that evaluated both mid-portion and insertional tendinopathies were eligible. The included studies evaluated males and females with a mean age of 37 years who had been diagnosed with Achilles tendinopathy, patella tendinopathy or lateral elbow tendinopathy.

Outcomes assessed in the review
Studies that evaluated at least one of the following outcomes were eligible for inclusion: pain, function, and patient satisfaction or return to activity. Various measures to assess these outcomes were used.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Study quality was assessed using published scales, both consisting of 11 criteria. The criteria included methods of randomisation, allocation concealment, blinding, intention-to-treat analysis, drop-out rates, timing of the outcome assessment in both groups, and between-group statistical comparisons. In cases where the criteria were unclear, authors were contacted. Three reviewers independently assessed study quality, and a consensus was reached to determine the final quality scores. Studies with scores of 6 or more using both scales were rated as good quality; those with a score of less than 6 were rated as low quality.
Data extraction
For continuous data, mean differences between pre-treatment and post-treatment scores and a standard deviation, assuming a covariance of zero, were calculated for each study. For dichotomous data, the numbers of events and sample sizes were extracted. Authors were contacted to obtain any missing data. The results for each study were expressed as a weighted mean difference (WMD) or relative risk (RR) with 95% confidence intervals (CIs). The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative. Where possible, the studies were pooled using a random-effects model and the results presented as RRs with 95% CIs.

How were differences between studies investigated?
Differences between the studies were reported in the tables and text.

Results of the review
Eleven RCTs (443 tendons) were included.

Six of the included studies were considered to be of a high quality.

Three studies reported on pain. Two studies reported significant improvements in pain with EE; both involved participants with patella tendinopathy. One study reported an improvement with EE in comparison with CE at 12 weeks (WMD 44.8 mm on visual analogue scale, 95% CI: 20.09, 69.51, p=0.0004), while another demonstrated improvements in comparison with ultrasound (RR 21, 95% CI: 1.4, 316, p=0.03) and frictions (RR 5, 95% CI: 1.5, 17.3, p=0.01) at 16 weeks. Both studies were of low methodological quality.

Seven studies reported on function, five of which found no difference between groups. One study found that EE increased Victorian Institute of Sports Assessment scores compared with CE for patella tendinopathy (WMD 45.9, 95% CI: 24.5, 67.3, p<0.0001). Another study involving the common extensor tendon origin reported a significant improvement in Ko scores after EE compared with ultrasound after 4 weeks (WMD 38.7, 95% CI: 29.8, 47.7, p<0.00001) and 11 months (WMD 39.2, 95% CI: 30.3, 48.1, p<0.00001). However, the first of these studies was of low methodological quality and the second used a non-validated functional outcome measure.

Patient satisfaction/return to activity was improved with EE for Achilles tendinopathy at 12 weeks in 2 low-quality studies (RR 2.4, 95% CI: 1.4, 4.2, p=0.003). One high-quality study demonstrated no significant effect after 12 months. Patient satisfaction/return to activity was not significantly different between EE and CE for patella tendinopathy at 12 weeks in 2 studies, but was significant after a mean of 33 months in one low-quality study (RR 17.3, 95% CI: 1.2, 260, p=0.04). In studies of lateral elbow tendinopathy, there was a significant improvement when EE was compared with ultrasound at 6 months (RR 22, 95% CI: 3.2, 152, p=0.002), but not when EE was compared with stretching at 6 months.

Authors' conclusions
There is a lack of high-quality evidence to support the effectiveness of EE in comparison with other treatments for relieving pain and improving function or satisfaction in patients with tendinopathies.

CRD commentary
The review question and inclusion criteria were clearly reported. The authors conducted an extensive search with no language restrictions. However, as no attempt was made to search for unpublished studies, publication bias might have been introduced into the review. The authors assessed validity using two published sets of criteria, and incorporated these results into their synthesis of the data. They also reported that three reviewers were involved in the validity assessment process, thus reducing any reviewer bias; it is not clear how many reviewers were involved in the other aspects of the review process. Details of the included studies were tabulated. It appears that the studies were appropriately summarised in a narrative synthesis. Some studies were pooled, but statistical tests of heterogeneity were
not reported for these analyses. Overall, the conclusions are likely to be reliable.

**Implications of the review for practice and research**

**Practice:** The authors did not state any direct implications for practice, but stated that clinicians should be aware of the lack of evidence for the superior effectiveness of this programme.

**Research:** The authors stated that further adequately-powered studies with adequate randomisation procedures, standardised outcome measures and long-term follow-up are required to assess the effectiveness of EE over other treatments. In addition, the effects of EE programme durations and intensities should be investigated.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.