Effectiveness of physiotherapy for lateral epicondylitis: a systematic review
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CRD summary
This review evaluated physiotherapy interventions for lateral epicondylitis (tennis elbow). The authors concluded that there was insufficient evidence of effectiveness for most interventions; only for ultrasound was there weak evidence of a beneficial effect. This was a generally well-conducted review and the results are likely to be reliable.

Authors' objectives
To assess the effectiveness of physiotherapy treatments for lateral epicondylitis of the elbow.

Searching
MEDLINE (from 1966 to 1999), EMBASE (from 1988 to 1999) and CINAHL (from 1982 to 1999) were searched for studies published in any language. Some details of the search strategy were presented. In addition, the Cochrane Controlled Trials Register and Current Contents (July 1999) were searched, and the reference lists in identified studies were checked. Only studies that were published in full were included.

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 compared a physiotherapy treatment with placebo, no treatment, or any conservative treatment were eligible for inclusion. Studies that compared physiotherapy with surgery were excluded. The included studies investigated laser, ultrasound, electrotherapy, and exercise and mobilisation techniques. These were compared with placebo, each other, other therapies, or combinations of therapies.

Participants included in the review
Studies of participants with lateral epicondylitis of the elbow or lateral elbow pain, that was increased by pressure on the lateral epicondyle and during resistance to dorsiflexion of the wrist, were eligible for inclusion. Most of the studies were of patients with a mix of acute, subacute and chronic lateral epicondylitis, but some studies included only patients with chronic epicondylitis. Some of the included studies excluded patients with concomitant neck or shoulder pain or just neck pain.

Outcomes assessed in the review
Studies that reported at least one clinically relevant outcome (pain, global improvement, elbow specific functional status, grip or sick leave) were eligible for inclusion if the outcomes were assessed after at least one day. The review assessed pain and global outcomes at short term (6 weeks or less), intermediate (6 weeks to 6 months) and long term (6 months or more). All but one study reported a short-term outcome. The included studies assessed pain using visual analogue scales, ordinal scales, or did not provide such details. The studies used a variety of measures to assess the global outcomes.

How were decisions on the relevance of primary studies made?
Two authors independently screened the abstracts of identified studies. Where there were doubts about the relevance of the studies, full reports were obtained and consensus was reached through discussion.

Assessment of study quality
Validity was assessed. Internal validity was scored using criteria on the Amsterdam-Maastricht list, including the duration of follow-up, drop-outs and adequacy of reporting. The possible scores for internal validity ranged from 0 to
12 points; studies scoring 7 or more were classified as having acceptable internal validity Two reviewers, blinded to the author, journal and year of the study, independently assessed validity and resolved any disagreements through discussion. Inter-reviewer agreement was assessed using the percentage of agreement and the kappa statistic. The help of native speakers or translators with expertise in the field content was sought for studies published in languages other than English, German and Dutch.

**Data extraction**

Two blinded reviewers independently extracted the data. For each study, the relative risk and 95% confidence interval (CI) were calculated for dichotomous data and the standardised mean difference (SMD) and 95% CI were calculated for continuous data. The methods used to calculate the SMD from the data presented were described. Where data were available, the SMDs for pain and relative risks for global improvement were calculated for short-term, intermediate and long-term outcomes. The power of each study to detect a clinically relevant difference (SMD of 0.5 and 0.8) was estimated for values of P=0.05, beta=0.80 and alpha=0.05.

**Methods of synthesis**

How were the studies combined?

A narrative synthesis of the studies was undertaken under the following headings: study characteristics, assessment of outcome, quality, and sample size and power. The studies were grouped by type of physiotherapy treatment in order to assess the effectiveness of the treatment. Data from the studies were only pooled in a meta-analysis using a random-effects model when the studies were of acceptable internal validity and were clinically homogeneous (similar timing of outcome assessment, control treatment and outcome) and statistically homogeneous (P>0.05). The evidence base for each physiotherapy intervention was classified as strong, weak or insufficient, based on the internal validity score, statistical significance, clinical relevance of differences between the treatments, and consistency of results among studies; full details of the methods used were presented.

How were differences between studies investigated?

Statistical heterogeneity of pooled data was tested for using the chi-squared statistic. Within each physiotherapy intervention, the studies were considered with reference to quality, statistical significance of the results, and power to detect a clinically relevant difference between the treatments, comparator intervention and duration of follow-up.

**Results of the review**

Twenty-three RCTs were included. Nine RCTs assessed ultrasound (about 398 patients), 9 RCTs assessed laser (about 425 patients), 5 RCTs assessed exercises or mobilisation (about 295 patients), and 4 RCTs assessed electrotherapy (about 114 patients).

Quality: the internal validity scores ranged from 1 to 11 out of a possible 12 points. Fourteen of the 23 included RCTs scored 7 or less. Methodological limitations included inadequate reporting of the results and small sample sizes. The sample sizes ranged from 5 to 60. None of the RCTs had sufficient power to detect an SMD of 0.5. Three low-quality RCTs had sufficient power to detect an SMD of 0.72 to 0.78. Laser (8 RCTs including 6 RCTs with acceptable validity): there was insufficient evidence to assess the effect of laser treatment. There was no significant difference in pain between laser and placebo in the short term. The results from 2 RCTs for intermediate and long-term follow-up were inconsistent for laser versus placebo and for laser versus other physiotherapy treatments. Ultrasound (3 RCTs with acceptable validity but low power): there was weak evidence that ultrasound was more effective than placebo. A pooled analysis of 2 RCTs showed that ultrasound was more effective than placebo at 4, 8 and 13 weeks (SMD 0.98, 95% CI: -1.64, -0.33). There was insufficient evidence to compare ultrasound treatment with other physiotherapy or conservative treatments. The results from 2 RCTs with acceptable validity were inconsistent for ultrasound compared with laser or exercises. Electrotherapy (4 RCTs): there was insufficient evidence to assess the effect of electrotherapy treatment. The one RCT with acceptable validity did not present sufficient data on the outcomes to permit an analysis. Exercises and mobilisation (5 RCTs): there was insufficient evidence to assess the effect of exercise and mobilisation treatment. The one RCT with acceptable validity showed that exercises were significantly better than ultrasound plus friction massage (SMD 0.95, 95% CI: -1.64, -0.26). The other 4 RCTs were either poor quality or did not present sufficient data.
Authors' conclusions
There was insufficient evidence for most physiotherapy interventions for lateral epicondylitis; only for ultrasound was there weak evidence of a beneficial effect.

CRD commentary
The review question was clear in terms of the study design, intervention, participants and outcomes. Several relevant sources were searched, studies published in any language were eligible, and some details of the search strategy were presented. No attempt was made to locate unpublished studies, thus raising the possibility of publication bias. At least two reviewers independently selected the studies, assessed validity and extracted data; this reduces the potential for bias and errors. Validity was assessed using validated criteria and the results were reported. Some information on the included studies was presented in the review and the authors reported that additional details were available on request. The studies were only combined in a meta-analysis if certain relevant conditions were met. The evidence base for each physiotherapy intervention was evaluated using clearly defined and appropriate criteria. The evidence presented appears to support the authors' conclusions.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice. Research: The authors stated that well designed and adequately reported trials are required to evaluate common physiotherapy treatments for lateral epicondylitis.

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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.