Effects of physiotherapy in patients with shoulder impingement syndrome: a systematic review of the literature
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CRD summary
This review found that for shoulder impingement syndrome, physiotherapist-led exercises and surgery appeared to be equally effective in the long-term. Home-based exercises appeared to be as effective as combined physiotherapy interventions. Passive treatments did not appear to be effective. Trials differed widely and there was insufficient high-quality evidence to reach definite conclusions. This judgement appears to be reliable.

Authors' objectives
To assess the effectiveness of physiotherapy in patients with clinical signs of shoulder impingement syndrome.

Searching
MEDLINE (from 1966), EMBASE (from 1988), CINAHL (from 1982), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials (CENTRAL), and PEDro were searched to December 2007. The search terms were reported and the reference lists of retrieved articles and systematic reviews were checked. Inclusion was limited to studies in English, German, or Dutch.

Study selection
Randomised controlled trials (RCTs) of physiotherapy for adults (aged over 16 years) with a diagnosis or at least one clinical sign of shoulder impingement syndrome, were eligible for inclusion. Clinical signs included pain with overhead activities, painful arc, Neer impingement, and Hawkins-Kennedy. The intervention could be any form or combination of active or passive physiotherapy, including exercise, proprioceptive training, manual therapy, massage therapy, education, or electrophysical procedures. Controls could receive an alternative form of physiotherapy, another physiotherapeutic procedure, surgery, placebo or no treatment. The outcomes of interest were pain and function. Comparisons between invasive techniques, trials of professional athletes, and trials including participants with other conditions (listed in the review) were excluded.

The mean age of participants in the included RCTs ranged from 43 to 67 years, where reported. Most of the trials included both men and women of similar ages. Their duration of symptoms, where reported, ranged from approximately three months to 32 months. The trial inclusion criteria and diagnostic criteria for shoulder impingement syndrome differed widely. The content and combination of interventions also varied widely across trials and the rationale for the selection of the various treatment components was frequently unclear. Controls received alternative active interventions, placebo or sham treatment, or no intervention. In some cases, the interventions in the treatment and control groups were similar. All trials reported pain and function, but they used a wide variety of outcome measures. The median duration of follow-up was 11 weeks (range three weeks to eight years).

The initial trial selection was conducted by a single reviewer. Where there was uncertainty, articles were checked by a second reviewer and a consensus was reached.

Assessment of study quality
Trials were allocated up to 10 points using the PEDro critical appraisal tool, which addresses randomisation, allocation concealment, baseline equivalence, blinding, follow-up rate, intention-to-treat analysis, and reporting of estimates of effect with measures of variability. Only trials scoring at least five points (designated high quality) were included in the review.

Two reviewers independently conducted the assessment.

Data extraction
Where possible, relative risks or mean differences were extracted or calculated from each trial, with 95% confidence intervals. Data were also extracted on the statistical significance of intergroup comparisons, as reported by the trial authors. Therapies were classified as combined if the nature of the main intervention was unclear.

The authors did not state how many reviewers performed the data extraction.

**Methods of synthesis**

Trial data were grouped by comparison and combined to obtain pooled relative risks and weighted mean differences, using a fixed-effect or random-effects model as deemed appropriate. Where pooling was not possible, a narrative synthesis was conducted, allocating levels of evidence according to van Tulder criteria.

**Results of the review**

Sixteen trials were included in the review (n=1,006 participants, range 14 to 138). The mean quality score was 6.8 out of a possible 10 points (range five to 10). Common quality limitations were a lack of reported allocation concealment, blinding, and intention-to-treat analysis, and incomplete outcome data.

There was limited evidence (one low-quality RCT) that physiotherapy was more effective than no treatment for functional improvement at six-month follow-up (RR 21.93, 95% CI 1.34 to 360.2; fixed-effect; one RCT; n=85), and that home-based exercises were more effective than no treatment for functional, pain and disability outcomes at 10-week follow-up (WMDs ranged from 1.2 to 16.0; CIs reported in the review; one RCT; n=67).

There was moderate evidence (consistent findings from multiple low-quality RCTs) of no difference in functional outcomes between physiotherapy with centring training for the shoulder and home-based exercises with isometric strengthening at five- to 12-week follow-up (three RCTs; n=141). There was moderate evidence that physiotherapist-led exercises with manual therapy were more effective for pain relief than physiotherapist-led exercises alone (SMD 0.88, 95% CI 0.36 to 1.40; random-effects; two RCTs with three- or eight-weeks follow-up; n=66). There was moderate-to-strong evidence that surgery was not more effective than physiotherapist-led exercises for pain and disability at follow-up periods ranging from six months to eight years (two RCTs; n=209).

There was limited evidence that ultrasound was neither more effective than sham treatment (one RCT; n=73), nor acupuncture (one RCT; n=85). The results were conflicting when low-level laser therapy (two RCTs; n=59) and electromagnetic field therapy (three RCTs; n=124) were compared with sham treatment.

**Cost information**

The authors noted that exercise therapy might be less expensive than surgery for people with shoulder impingement syndrome.

**Authors' conclusions**

For treatment of shoulder impingement syndrome, physiotherapist-led exercises appeared to be as effective as surgery in the long term and home-based exercises appeared to be as effective as combined physiotherapy exercises. Passive treatments did not appear to be effective, but the trials differed widely and there was insufficient good-quality evidence to reach definite conclusions.

**CRD commentary**

The objectives and inclusion criteria were clear and relevant sources were searched for trials, but the restriction to specific languages means that the review might be prone to language bias. It is also possible that more specific attempts to locate unpublished trials might have retrieved further evidence. Steps were taken to reduce the risk of reviewer bias and error by having more than one reviewer independently assess trial validity, but it was unclear whether this also applied to data extraction. The initial study selection was performed by a single reviewer, which increases the risk of bias. The characteristics and results of the primary trials were presented in adequate detail. Appropriate statistical techniques were used to combine the data, where possible, although no formal assessment of statistical heterogeneity was reported. Where data could not be combined statistically, trials were combined in a narrative synthesis, using an appropriate format (levels of evidence) which prioritised by the quality of evidence.
The authors acknowledged some review limitations, including clinical and methodological heterogeneity, quality limitations in the RCTs, the small amount of evidence, and short follow-up periods. As they noted, trials differed widely and there was insufficient high-quality evidence to reach definite conclusions; this judgement appears to be reliable.

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

**Practice**: The authors stated that patients with shoulder impingement syndrome should not undergo surgery before being treated conservatively. Surgery should be performed only where there are clear indications.

**Research**: The authors stated that more high-quality RCTs were required on the treatment of shoulder impingement syndrome, with longer durations of follow-up. These trials should apply clearly defined interventions to clearly defined clinical patterns, using a structured decision-making process. They noted the need for a valid classification system for shoulder disorders, for standardised shoulder-specific outcome measures, and for improved reporting.

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