The effectiveness of physiotherapy exercises in subacromial impingement syndrome: a systematic review and meta-analysis
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CRD summary
This review assessed the effectiveness of physiotherapy exercises in the treatment of people with subacromial impingement syndrome and concluded that exercise was effective. Given potential for missed data, variability between trials and the limited evidence base that appeared to indicate only small treatment effects, the authors’ conclusions may be overstated. The authors’ implications for research and practice seem appropriate.

Authors’ objectives
To assess the effectiveness of physiotherapy exercises in the treatment of people with subacromial impingement syndrome.

Searching
Ten electronic databases (including EMBASE and Cochrane Central Register of Controlled Trials) were searched from inception to August 2010 for publications in English. Search terms were reported. Reference lists of retrieved articles were searched manually.

Study selection
Eligible studies were randomised controlled trials (RCTs) that investigated the effectiveness of physiotherapy exercise in the treatment of stage I or II subacromial impingement syndrome or rotator cuff disease/tendinopathy. Outcomes of interest were pain, strength, patient-reported function and quality of life. Trials in patients with rotator cuff rupture, alternative diagnoses (as defined in the review) and post-surgical patients were excluded. Adverse events were reported.

The mean age of included participants was 49.2 years and mean duration of symptoms was 21.9 months. Intervention groups received various forms of exercise (including stretching and strength exercises) at varying intensities. Control groups received a wide range of active or placebo interventions including usual care, placebo electrotherapy and simple analgesia. Each outcome was assessed using a wide variety of measurement tools (mainly questionnaires or rating scales).

One reviewer screened studies for inclusion. Ambiguous studies were discussed with two additional reviewers.

Assessment of study quality
Trial quality was assessed according to the Cochrane risk of bias tool and van Tulder criteria. Trials that scored greater than 6 out of 12 on the van Tulder scale were rated as high quality (met 4 of 5 risk of bias criteria) or medium quality (met 3 of 5 risk of bias criteria). Trials with van Tulder scale scores of less than 6 and that only met two risk of bias criteria were considered to be low quality. Best evidence synthesis guidelines were used to assess the strength of evidence for each outcome.

Two reviewers independently assessed trial quality. Any discrepancies were resolved through consensus.

Data extraction
Means and standard deviations were extracted or calculated to estimate mean differences and their 95% confidence intervals. Where trials included more than one control group, the group with the least amount of therapist contact and treatment was selected as the control (as defined in the review).

Primary authors were contacted for additional information where necessary. One reviewer performed the data extraction.

Methods of synthesis
Data were presented as a narrative synthesis. Where appropriate trials were pooled using meta-analyses. A random
effects model was used to pool data to calculate standardised mean differences and their 95% confidence intervals. An effect size of 0.8 reflected a large effect size, between 0.5 and 0.8 a medium effect size and between 0.2 and 0.5 a small effect size.

Statistical heterogeneity was assessed using the $I^2$ statistic. Subgroup analyses were conducted to examine the effects of follow-up duration on the outcomes: short-term (six to 12 weeks) and long-term (>12 weeks).

**Results of the review**

Sixteen RCTs (1,162 participants) were included in the review. The mean score on the van Tulder scale was 6.9 (range 2 to 10); four RCTs were of high quality, seven were medium quality and five were low quality. Six RCTs were of sufficient quality to be included in meta-analyses. Follow-up ranged between one and three days and two and a half years.

**Pain**
Qualitative analysis suggested there was strong evidence that exercise was effective at reducing pain in the short-term (two out of four high quality RCTs) but quantitative analyses indicated no statistically significant differences in pain in the short-term between treatment groups (four RCTs); there was evidence of statistical heterogeneity ($I^2=87\%$).

**Patient-reported function**
Qualitative analysis suggested there was strong evidence that exercise was effective at improving patient-reported function in the short-term (two out of four high quality RCTs) and long-term (two out of four high quality RCTs). Quantitative analyses showed there were no statistically significant differences in short-term patient-reported function between treatment groups (five RCTs; $I^2=74\%$) but exercise had a small borderline statistically significant effect in the long-term (SMD $-0.31$, 95% CI $-0.57$ to $-0.04$; two RCTs; $I^2=0\%$).

**Strength**
Qualitative synthesis suggested that there was moderate evidence that exercise was effective in improving strength (two high quality RCTs) in the short term and quantitative analyses supported this (SMD $-0.45$, 95% CI $-0.75$ to $-0.15$; two RCTs; $I^2=0\%$).

**Quality of life**
Qualitative synthesis suggested there was moderate evidence that exercise was effective in improving and quality of life (one high quality RCT) in the short term but quantitative analyses did not support this (two RCTs; $I^2=41\%$).

Other results were reported in the review.

**Authors' conclusions**
Exercise is effective in the management of patients with subacromial impingement syndrome.

**CRD commentary**
The review question and inclusion criteria were stated clearly. A substantial number of sources were searched for relevant data. The search was restricted by language so relevant data may have been missed. The authors did not formally assess publication bias due to the small number of included trials but acknowledged the potential bias. Trial quality was assessed and indicated a number of issues with the included trials. It appeared that trial quality was performed in duplicate but there may have been reviewer error and bias in the remaining review processes.

A best evidence synthesis was presented and included both qualitative and quantitative results. Sometimes the findings were contradictory. Only small numbers of studies reported on the different outcomes. The authors acknowledged that the findings should be interpreted with caution and this should be heeded.

Given the potential for missed data, variability between trials and the limited evidence base that appeared to indicate only small treatment effects, the authors' conclusions may be overstated. The authors' implications for research and practice seem appropriate.

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

**Practice:** The authors stated that there was insufficient evidence to determine whether one mode of exercise was superior to another or to direct clinicians toward optimal intensities or frequency of exercise.

**Research:** The authors stated that good quality trials with realistic follow-up periods were needed to investigate the
treatment effect of exercise alone compared to other modalities and to consider specific elements of exercise to
determine whether there was a dose-response effect. Future trials should include objective outcome measures and
assess a range of validated, generic, region-specific and disease-specific outcomes.

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