Effects of rehabilitative interventions on pain, function and physical impairments in people with hand osteoarthritis: a systematic review

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CRD summary
This review concluded that there was emerging high quality evidence that some rehabilitation interventions could be beneficial in hand osteoarthritis. This conclusion reflects the data presented, but the authors' specific statements about treatment effects should be interpreted cautiously, as each statement is based only on the results of a single small trial.

Authors' objectives
To assess the effectiveness of rehabilitation treatments in adults with hand osteoarthritis.

Searching
MEDLINE, CINAHL, Web of Science and Scopus were searched from inception to October 2010; Physiotherapy Evidence Database (PEDro) was searched to 1999. The search strategy was provided in a separate online appendix. Experts in the field were contacted and bibliographies of systematic reviews were screened for additional studies. Only full publications in English were included.

Study selection
Randomised controlled trials (RCTs), quasi-RCTs, or crossover trials that compared rehabilitation (such as exercise, splints, heat therapy, electrotherapy, acupuncture, massage) with control (no treatment, usual care, or placebo) in adults with hand osteoarthritis were eligible for inclusion. Trials had to report at least one of the outcomes of hand pain (individual joints or overall), self-reported hand physical function, other measures of hand impairment (like grip strength or range of motion), or stiffness.

Participants in the included trials were aged between 56 and 82 years. The proportion of men ranged from 5 to 38%. Half of the trials involved patients with both carpometacarpal joint and interphalangeal joint osteoarthritis. One trial involved patients with osteoarthritis of the carpometacarpal joint only. The other trials did not specify the affected joints. The diagnosis of hand osteoarthritis was based on clinical or radiologic criteria or a combination of both (where reported). Six different rehabilitation interventions were investigated (splints, laser therapy, heat therapy, exercise programs, massage, and acupuncture). Treatment duration ranged from two to 52 weeks. Most of the included trials reported outcomes immediately after treatment. Some studies also reported longer term follow-up (two weeks to one year).

Two reviewers independently assessed studies for inclusion and any disagreements were resolved by consultation with a third reviewer.

Assessment of study quality
The methodological quality of included trials was assessed using the PEDro scale with 11 criteria; one criterion for external validity and ten for internal validity. Internal validity was scored on randomisation, allocation concealment, baseline equivalence of treatment and control groups, blinding of participants, operators and assessors, drop-outs, intention-to-treat analysis, and reporting of results. The maximum quality score was 10.

Two reviewers independently assessed the methodological quality of included studies. Any disagreements were resolved by consultation with a third reviewer.

Data extraction
Data were extracted on the category of outcome (pain, hand function, hand strength, range of motion, stiffness) and the measurement tool used to assess outcome. Standardised mean differences (SMDs) with 95% confidence intervals (CIs) between treatment and control groups were calculated (method unspecified) for each trial and outcome category. Trials
could provide data for multiple outcome categories, but only one data set per category was selected for each trial. A full hierarchy for data selection was reported in the article.

Data were extracted using a predefined form, but the authors did not state how many reviewers performed the data extraction.

**Methods of synthesis**
Trials were combined in a narrative synthesis and forest plots, grouped by outcome category.

**Results of the review**
Ten trials (544 patients, range 13 to 112) were included in the review: seven RCTs, two cross-over trials and one quasi-RCT. Trial quality scores ranged from 3 to 10. Six trials were considered to be of relatively high quality (scores of over 5, cited as over 6 in review abstract). Four trials were considered to be of low quality.

**Pain** (eight trials, 412 patients): At least one trial reported data for each of the six rehabilitation interventions. One higher quality trial showed a positive treatment effect for long-term (12 months continuous) use of a night splint (SMD 4.24, 95% CI 3.52 to 4.97), but no significant short-term effect. No other trial assessed splint use. One lower quality trial showed a positive effect for massage (SMD 1.18, 95% CI 0.26 to 2.10). None of the other trials showed any significant treatment effect for any of the other interventions.

**Self-reported hand function** (six trials, 320 patients): At least one trial reported data for five of the treatment interventions, but none of the trials assessed the effects of massage. One higher quality trial showed positive long-term (SMD 3.73, 95% CI 3.05 to 4.40) and short-term (SMD 1.10, 95% CI 0.68 to 1.52) treatment effects for the use of a splint; none of the other trials assessed splint use. None of the other trials showed any significant treatment effect for any of the other interventions.

**Strength** (ten trials, 480 patients): At least one trial reported data for each of the six rehabilitation interventions. One higher quality trial reported long-term (SMD 1.2, 95% CI 0.8 to 1.6) and short-term (0.9, 95% CI 0.5 to 1.3) improvements in hand strength (measured by means of an electronic dynamometer) for splinting; none of the other trials assessed splint use. A higher quality trial reported significant improvements (measured by vigorimeter) for a home range of motion exercise program (SMD 4.5, 95% CI 3.3 to 5.7). One higher quality trial (from which no effect size could be calculated) reported significant improvement in grip strength (p=0.041) measured with a dynamometer following laser therapy. None of the other trials showed any significant treatment effect for any of the other interventions.

**Range of motion** (four trials, 282 patients): At least one trial reported data for each of three interventions (splints, laser therapy and exercise). One higher quality trial showed a significant long-term positive treatment effect for splinting (SMD 3.30, 95% CI 2.7 to 3.9), with a small negative effect in the short term (SMD -0.4, 95% CI -0.8 to -0.03); none of the other trials assessed splint use. One lower quality trial (from which no effect size could be calculated) reported a significant positive effect for hand strengthening exercises. None of the other trials showed any significant treatment effect for any of the other interventions.

**Stiffness** (three trials, 162 patients): One trial each assessed laser therapy, heat therapy and exercise. None of the trials reported a significant treatment effect.

**Authors’ conclusions**
There was emerging high quality evidence that some rehabilitation interventions could be beneficial in hand osteoarthritis. Long-term use of a night splint significantly improved pain, hand function, strength, and range of motion. Programs of joint protection, advice, and home exercises were effective at improving grip strength and hand function. Low-level laser therapy was effective at improving range of motion. None of the rehabilitation interventions were found to improve stiffness.

**CRD commentary**
The review stated a clear research objective. Appropriate inclusion criteria were defined. A range of sources were
searched for relevant studies, but the restriction to published English language publications may have resulted in the omission of some studies and raised the possibility of language and/or publication bias. Measures to minimise error and/or bias were applied, although it was not clear how many reviewers performed the data extraction.

The methodological quality of included trials was assessed and, although summary scores were calculated, the full results of quality assessment were provided. The use of a narrative synthesis was appropriate, given the apparent heterogeneity of the included studies.

The authors’ conclusions reflect the data presented, but the specific statements about treatment effects should be interpreted cautiously, as each statement is based only on the results of a single small trial.

Implications of the review for practice and research

Practice: The authors did not specify any recommendations for practice.

Research: The authors stated that further high-quality research was urgently needed on the effects of rehabilitation interventions on specific patient goals. Future research should include: higher-quality, well-powered studies that adhere to the CONSORT guidelines; the use of common outcome measures that adequately capture functional impairment; and assessment of the role of exercise with consideration of the optimal frequency and intensity of training.

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