

**Wallis JA, and Taylor NF. Pre-operative interventions (non-surgical and non-pharmacological) for patients with hip or knee osteoarthritis awaiting joint replacement surgery - a systematic review and meta-analysis. Osteoarthritis and Cartilage 2011; 19: 1381-1395.**

**Design:** Systematic Review and meta-analysis of randomized clinical trials

**Date:** 5-7-15 LM

**Study Question:** To determine if pre-operative exercise provide benefit before and after joint replacement for patients with hip and knee osteoarthritis awaiting lower limb joint replacement surgery.

**PICOs:**

- **Patients:** Adults with hip or knee osteoarthritis (OA) awaiting hip or knee replacement surgery.
- **Interventions:** Pre-operative exercise
- **Comparison interventions:** Standard care or non-exercise interventions
- **Outcomes:** Pain, activity limitations, and function
- **Study types:** Randomized controlled trials (RCTs)

**Study selection:**

- Databases included MEDLINE, CINAHL, PUBMED, and EMBASE through August 2010 and only English publications were eligible for inclusion.
- Two review authors independently screened articles by title and abstract for trial inclusion utilizing predetermined eligibility criteria and resolved any disagreements by discussion.
- Database searching was supplemented by hand searching the reference lists of included articles and the application of citation tracking using Google scholar.
- All included trials were critically appraised for methodological quality or risk of bias by two researchers using the 11 item validated PEDro scale. A trial with a score of 6 or more was considered to be high quality consistent with previous reviews.
- As the studies used a variety of different scales to measure comparable outcomes across trials, a unitless measure of treatment effect size was needed to allow the results of the various RCTs to be pooled. Standardized mean differences (SMD) were used to calculate treatment effect sizes, and to obtain a summary estimate. Positive SMD values were used to indicate that the outcome favored the intervention group. A SMD <0.2 was considered a small effect, 0.2-0.5 a moderate effect and >0.8 a large effect.
- The GRADE approach was applied to each meta-analysis performed to determine the quality of evidence. This approach entailed downgrading the evidence based on the following criteria; (1) the PEDro score was <6 for the majority of trials in the meta-analysis, (2) there was greater than low levels of statistical heterogeneity between the trials ( $I^2 \geq 25\%$ ), and (3) there were large confidence intervals indicating a small number of participants.

## Results:

- Overall 23 RCTs with a total of 1461 participants with symptomatic hip or knee OA were included. 922 were awaiting knee replacement, 305 awaiting hip replacement and 234 awaiting either hip or knee replacement. Only four RCTs had more than 50 participants in each allocation. The mean age of participants was 67.2 years and 66% were women. Average body mass index was 30.2 kg/m<sup>2</sup>. The mean number of days on the waiting list for surgery was 81 days, and mean duration of osteoarthritis symptoms was 6.7 years.
- Study quality was assessed with the PEDro scale. There were 12 higher quality trials ( $\geq 6/10$ ), and eight studies scored 7 or 8 on the PEDro scale that were assessed as 'low risk of bias'. The most adhered to items on the PEDro scale were random allocation, measures of variability for at least one key outcome, and between group comparisons which were evident in almost all of the trials. None of the trials blinded participants or therapists. All studies provided random allocation. Eight trials used allocation concealment and 11 had blinded outcome assessors. Nine trials reported intention to treat analysis.
- Effect of pre-operative exercise with education vs standard care for hip osteoarthritis was assessed using the Harris hip score (HHS). The HHS was developed for the assessment of the results of hip surgery, and is intended to evaluate various hip disabilities and methods of treatment in an adult population. The domains covered are pain, function, absence of deformity, and range of motion. Meta-analysis of two trials with 82 participants provided moderate quality evidence for improved Harris hip score 3 months following hip replacement. The moderate effect size was significant (SMD = 0.53, 95% CI = 0.09, 0.97) and clinically relevant and favored the exercise intervention. Between-study heterogeneity was negligible ( $I^2 = 0\%$ ).
- All of the other meta-analyses investigating pre-operative interventions, particularly exercise, for knee or hip osteoarthritis included only trials of low to moderate quality and produced evidence that was not of high enough quality to report.

## Authors' conclusions:

- There is moderate quality evidence from two small RCTs that preoperative exercise and education programs improve function 3 months after hip replacement.
- Low to moderate quality evidence from mostly small RCTs demonstrated that pre-operative interventions, particularly exercise, reduce pain for patients with hip and knee osteoarthritis prior to joint replacement, and exercise with education programs may improve activity after hip replacement.
- The results of this systematic review provide low to moderate quality evidence that pre-operative interventions, particularly exercise, can have a modest effect prior to joint replacement surgery mainly by reducing pain for knee and hip osteoarthritis and improving activity for hip osteoarthritis. The results also provide low to moderate quality evidence that patients who completed exercise and education programs before hip replacement surgery may have improved function and activity in the short term after surgery. Despite these benefits, little postoperative benefit has been demonstrated for outcomes including pain, musculoskeletal impairment, activity

- performance for knee osteoarthritis, quality of life, length of stay and discharge destination.
- The value of these pre-operative interventions including exercise is limited if they make minimal difference postoperatively. It is possible that marked reduction of pain that comes from replacing painful joint surfaces during surgery far outweighs the modest contribution from pre-operative interventions.
  - With the limited benefit for patients in the postoperative period, it could be considered that pre-operative interventions for osteoarthritis are not worthwhile, particularly for knee osteoarthritis.
  - Further research is needed that focuses on postoperative outcomes during the hospital stay.

### **Comments:**

- Most included RCTs in this systematic review were small, providing low to moderate evidence. While small studies often suffer from lack of power, they also often result in a greater risk of inflated effect sizes.
- While a wide variety of outcomes were used, many of the outcome measures evaluated were not of primary importance.
- A strength of this systematic review is that it followed the preferred reporting items for systematic reviews and meta-analyses using the (PRISMA) guidelines. Applying the GRADE approach to each meta-analysis performed to determine the quality of evidence helped to increase the level of confidence in the results.
- A limitation in this systematic review is that the search strategy did not include other languages and did not include all databases such as the Cochrane Central Register of Controlled Trials, so this could result in publication bias.
- Much subjectivity was present in deciding which trials had sufficient clinical homogeneity to combine in meta-analyses. In fact, only a few trials were chosen to be involved in the meta-analyses (10 of the 23 trials). In addition, some type of quality criteria should also have been considered when combining trials in meta-analyses, because combining low quality trials with high quality trials puts into question the validity of the meta-analyses results and reduces confidence in the findings. This limitation is manifested by the fact that only one meta-analysis was rated high in quality of the evidence.

### **Assessment:**

- Adequate quality meta-analysis which supports good evidence that preoperative exercise with education programs improve function 3 months after total hip replacement among people with symptomatic osteoarthritis of the hip.