

## Treatment Critically Appraised Topic

**Are lower extremity strengthening exercises as effective as strengthening and physical therapy modalities to allow active adults with early knee osteoarthritis to high impact activity?**

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### **Clinical Scenario**

Osteoarthritis is the most common condition affecting the synovial joints. (Lopez & Murray, 1998) Knee osteoarthritis is commonly seen in physiotherapy clinics. Early knee osteoarthritis is treated in a variety of ways, including the use of various modalities in conjunction with physical therapy modalities. The use of modalities can be time consuming and are a passive form of treatment. To allow patients to better self-manage, it is important to determine if strengthening exercises alone are as effective as the combined treatment of strengthening exercises and modalities. The desired population is active adults (as the clinical population of interest for the writer is military members).

### **Search Strategy**

Medline, CINAHL, EMBASE and the Cochrane Databases (both of Systematic Reviews and Clinical Trails) were searched. A search of SPORT Discus and PEDro revealed many of the same articles. The keywords and subject headings used are listed below.

MeSH (or CINALH subject headings): osteoarthritis, osteoarthritis/knee, exercise therapy, resistance training, rehabilitation, physical therapy.

Keywords: athlete, military, military member, army, strength training, armed forces.

After completion of the various searches, a total of eleven articles were retrieved. Several provided interesting background reading but did not address the question at hand. Three looked at the effects of manual therapy of the knee compared to exercise, these studies were excluded as manual therapy was not considered in this research question. Ultimately, five studies were selected. All five were randomized-controlled trails. None of the searches resulted in literature that examined the ideal population for this search.

## Citations

- Cetin, N., Aytar, A., Atalay, A., & Akman, M. N. (2008). Comparing hot pack, short-wave diathermy, ultrasound, and TENS on isokinetic strength, pain, and functional status of women with osteoarthritic knees A single-blind, randomized, controlled trial. *American Journal of Physical Medicine & Rehabilitation*, 87(6), 443-451. \*\* selected for appraisal
- Huang, M., Lin, Y., Lee, C., & Yang, R. (2005). Use of ultrasound to increase effectiveness of isokinetic exercise for knee osteoarthritis. *Archives of Physical Medicine and Rehabilitation*, 86(8), 1545-1551. doi:DOI: 10.1016/j.apmr.2005.02.007
- Jan, M., Lin, J., Liao, J., Lin, Y., & Lin, D. (2008). Investigation of clinical effects of high- and low-resistance training for patients with knee osteoarthritis: A randomized controlled trial. *Physical Therapy*, 88(4), 427-436.
- King, L. K., Birmingham, T. B., Kean, C. O., Jones, I. C., Bryant, D. M., & Giffin, J. R. (2008). Resistance training for medial compartment knee osteoarthritis and malalignment. *Medicine & Science in Sports & Exercise*, 40(8), 1376-1384.
- Tuzun, E. H., Aytar, A., Eker, L., & Daskapan, A. (2004). Effectiveness of two different physical therapy programmes in the treatment of knee osteoarthritis. *Pain Clinic*, 16(4), 379-387. doi:<http://dx.doi.org/10.1163/1568569042664468>

## Summary of Study

**Population:** 100 women with bilateral knee osteoarthritis (all grades, although the majority were diagnosed with Grade 2 or 3 osteoarthritis).

**Inclusion Criteria** – bilateral knee osteoarthritis, able to walk at least 100m on an even surface, full (or near-full) passive range of motion bilaterally.

**Exclusion Criteria** – history of previous knee surgery, lower-extremity arthroplasty, intraarticular injection of hyaluronic acid or steroids in the last six months.

**Interventions:** Subjects were divided into five different treatment groups. All five groups completed the same isokinetic strengthening program after the modality application.

**Group 1:** received Short Wave Diathermy (SWD) followed by hot pack application.

**Group 2:** received Transcutaneous Nerve Stimulation (TENS) followed by hot pack application.

**Group 3:** received ultrasound followed by hot pack application.

**Group 4:** received only hot pack application.

**Group 5:** served as a control group and only completed the exercise program.

**Outcomes:** Four main outcomes were reviewed.

1. Index of Severity for Knee Osteoarthritis (ISK)
2. Walking Speed – speed for walking 50m was times with a stopwatch
3. Visual Analog Scale (VAS) – pain severity after the 50m walk
4. Isokinetic strength for knee flexion and extension at 60, 120 and 180 degrees per second.

**What Happened:** 15 participants withdrew from the study as a result of knee pain. 15 additional participants discontinued the exercise program as a result of exercise-induced knee pain.

## Appraisal

### Validity Check List:

The patients were randomly assigned to one of the five treatment groups. Statistical analysis of the groups showed that there was no statistically significant difference between groups ( $P = 0.221 - 0.976$ ) in terms of age, body mass index, compliance with program and grade of osteoarthritis. All patients were assessed at both baseline and after treatment by a physician who was blinded to the treatment received. Participants and clinicians providing the treatment were not blinding, which appears reasonable given the nature of the interventions.

### Results:

**ISK:** There were statistically significant reductions in the Index of Severity scores among the five groups ( $P=0.018$ ). There were no statistically significant difference between Groups 3 and 4 and the control group (5), ( $P=0.102$  and  $0.073$ , respectively). A pair wise comparison revealed Groups 1 and 2 were significantly different from the control group ( $P=0.022$  and  $0.001$ , respectively).

**VAS:** All groups showed decreases in VAS scores after the intervention. Participants in Groups 1 through 4 showed the most degree of pain reduction and differed significantly from the control group ( $P=0.019$ ).

**Walking Time:** Walking time decreased significantly in all groups, with no statistically significant differences between the groups ( $P=0.589$ ).

**Isokinetic Strength:** Groups 1-5 should statistically significant increases in peak torque strength following the intervention. Groups 1, 2 and 3 had statistically significant higher peak torque values ( $P<0.05$ ) at all angular velocities when compared to the control group. There was no statistically significant difference between Group 4 and the control group during right knee extension at 180 degrees/second ( $P=0.114$ ) and left knee extension at all angular velocities ( $P=0.142 - 60$  degrees/second,  $P=0.102$  at 120 degrees/second,

$P=0.076$  at 180 degrees/second). While Groups 1 through 4 were similar at all angular velocities for right and left knee flexion, there were statistically significant differences for right knee extension in the following groups. Groups 1 and 4,  $P=0.037$  at 60 degrees/second,  $P=0.008$  at 180 degrees/second. Groups 2 and 3,  $P=0.01$  at 120 degrees/second. Groups 2 and 4,  $P=0.01$  at 180 degrees/second. During left knee measurement, there was a statistically significant difference between Groups 1 and 4 ( $P=0.005$ ) at 60 degrees/second, ( $P=0.01$ ) at 120 degrees/second; Groups 2 and 4 ( $P=0.038$ ) at 60 degrees/second; and Groups 3 and 4 ( $P=0.015$ ) at 60 degrees/second.

**Applicability:** Unfortunately, while this was a well executed and reported study, the applicability to my patient population is limited. That said, the outcomes show that the groups who received modalities in addition to heat and isokinetic exercise had improved scores in almost all areas tested. As a result, discontinuing use of physiotherapy modalities in the clinic setting would not be reasonable based on the results of this study.

### **Conclusion**

At this time, further research is required into the effects of strengthening alone as a treatment for knee osteoarthritis. There is evidence in the literature to support the use of strengthening alone; this study identifies the improvements in all areas tested in the control group that received isokinetic strengthening alone. The evidence from this study though shows that while results are statistically significant with strengthening on it's own, they are significantly better when the modalities of SWD, TENS or ultrasound are used in conjunction with the strengthening activities.