

**TITLE:** The effect of preoperative physical therapy on total knee arthroplasty in patients with end-stage knee osteoarthritis: a pilot study.

**PURPOSE/HYPOTHESIS:** A common form of medical management for knee osteoarthritis (OA) is total knee arthroplasty (TKA). Physical therapy (PT) has been shown to be an effective treatment for patients with knee OA in various early stages of the disease. The purpose of this study was to determine if PT improves preoperative clinical status in patients who are medically indicated for TKA.

**NUMBER OF SUBJECTS:** 19 participants, 11 females (58%) and 8 males (42%), with mean age 66.7 years old ( $\pm 5.4$ ) and mean BMI of 34.7 points ( $\pm 5.9$ ).

**MATERIALS/METHODS:** Patients with end-stage knee OA were randomly allocated to receive physical therapy (PT, n=9) or standard care (NPT, n=10) prior to TKA. The preoperative PT intervention consisted of 12 weeks of a standardized protocol of stretching, progressive strengthening, balance training, and cardiovascular exercise. Data collection included a self-report PROMIS score, numeric pain scale rating (NPRS, Pain), and Timed Up and Go Test (TUG). Data was collected at the enrollment session (TUG1, Pain1, PROMIS1) and at the preoperative visit (TUG2, Pain2, PROMIS2). The patient-reported number of PT visits was recorded. ANCOVA was completed to assess for “group effect” and “as treated effect” with a 95% confidence interval ( $p \leq .05$ ).

**RESULTS:** There was no statistical significance found in favor of either group’s effect on any of the 3 variables. Both groups’ subjects had similar outcome measurements ( $p > .05$ ) at enrollment. Enrollment data was, mean (SD) for TUG1 PT group = 14.4 (3.5) sec and NPT group = 15.9 (7.3) sec. PT for Pain1 = 6.3 (2.2) points and NPT = 6.7 (2.1) points. PT for PROMIS1 = 38.1 (3.6) points and NPT = 36.3 (5.8) points. For follow-up outcomes, the mean (SD) for TUG2 was PT group = 15.3 (3.8) sec and NPT group = 17.8 (5.3) sec. PT for Pain2 = 5.4 (2.9) points and NPT = 5.7 (2.4) points. For PROMIS2, PT = 38.4 (3.4) and NPT = 34.4 (5.8). The number of completed PT visits varied. In the PT group, visits ranged from 0 (3 subjects) to 12 (1 subject). No one in the NPT group attended PT. No differences ( $p > .05$ ) were found for the effect of PT visits on any outcomes. The effect of number of PT visits on pain was -0.38 pain points per visit. Of 19 participants, 16 elected to have surgery following the 12-week preoperative period. 3 participants decided to not have surgery, 2 of which were in the PT group and completed 8 visits each.

**CONCLUSIONS:** While there were no clinical changes in favor of either group, this pilot data may provide some insights. The number of PT visits influenced pain scores (-0.38 points per visit), projecting to a decrease of about 4.5 points over 12 visits. The MCID for the NPRS has been reported as low as 1 point or 15% change. A larger sample size may demonstrate continued trends toward an effect of PT on TUG times, even if only to attenuate the loss of function. Preoperative PT may help some patients delay surgery as 2 out of 9 subjects in the PT group decided to forego TKA after 8 visits of PT.

**CLINICAL RELEVANCE:** Although this relatively small amount of data does not show statistical significance, it is possible that physical therapy provides benefit to patients with severe knee OA as defined by TUG times and numeric pain scores. Preoperative PT may improve patient functional status, and could potentially decrease or prolong the need for TKA. Continuation of this study by adding to the pilot data will help to clarify the benefits of this intervention.

## REFERENCES:

1. Beaupre LA, Lier D, Davies DM, Johnston DBC. The effect of a preoperative exercise and education program on functional recovery, health related quality of life, and health service utilization following primary total knee arthroplasty. *J Rheumatol*. 2004;31(6):1166-1173.
2. Rooks DS, Huang J, Bierbaum BE, et al. Effect of preoperative exercise on measures of functional status in men and women undergoing total hip and knee arthroplasty. *Arthritis Rheum*. 2006;55(5):700-708.
3. Lange AK, Vanwanseele B, Fiatarone Singh MA. Strength training for treatment of osteoarthritis of the knee: a systematic review. *Arthritis Rheum*. 2008 Oct 15;59(10):1488-94.
4. King LK, Birmingham TB, Kean CO, Jones IC, Bryant DM, Giffin JR. Resistance training for medial compartment knee osteoarthritis and malalignment. *Med Sci Sports Exerc*. 2008;40(8):1376-1384.
5. Reviewed by Van Der Laan, K; Updated by Tappan R, Tseng E, and SCI EDGE task force of the Neurology Section of the APTA. Rehab Measures: Numeric Pain Rating Scale. 2012 Jul; <http://www.rehabmeasures.org/Lists/RehabMeasures/DispForm.aspx?ID=891>. Accessed April 18, 2016.