

The Influence of Passive Joint Mobilization on Knee Osteoarthritis Symptoms: A Preclinical Model

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PURPOSE: To determine the influence of passive joint mobilization (PJM) on pain and function symptoms of knee osteoarthritis.

METHODS: Twenty 12-week-old male C57BL/6 mice were separated into two groups:(1) PJM and (2) control. Both groups received surgery to induce osteoarthritis, but the PJM therapy was only given to the PJM group. The right-side medial meniscus was destabilized on all mice to induce osteoarthritis. After 6 weeks, mice developed mild osteoarthritis and open-field gait testing was performed. For open-field testing, mice walked in a grid while being recorded on video from above for a standard time of 2 minutes. A machine-learning algorithm then determined the total travel distance walked and stride length. Mice were anesthetized using isofluorine gas during the PJM procedure to prevent excessive movement. The right knees of the PJM group were loaded into extension at 2-4 N, 20 extensions/min for 3 minutes, 3 days a week for 6 additional weeks. During this time, Von-Frey pain measurements were obtained each procedure day for all mice. For the PJM group, Von-Frey scores were obtained 30 minutes after loading to allow the effects of anesthesia to subside. Final gait testing was then performed. Mann-Whitney U-tests were used to determine whether PJM mice experienced significantly less pain and greater travel distance walked and stride length at the end of the treatment period compared with control mice.

RESULTS: Von-Frey pain testing demonstrated that osteoarthritic mice who obtained PJM were significantly less likely to be sensitive, particularly during the last 3 of 6 weeks of their treatment. Osteoarthritic mice obtaining PJM had a significantly greater stride-length in open-field testing compared to control mice ($p=0.001$), but not in total travel distance ($p=0.44$).

DISCUSSION: Pain and stride length, but not total travel distance was improved in osteoarthritic mice obtaining PJM compared with control mice. This indicates that PJM is most effective at managing pain response as osteoarthritis progresses, with limited impact on physical function.

SIGNIFICANCE/CLINICAL RELEVANCE: Orthopaedic surgeons recommending physical therapy for osteoarthritis can prescribe manual therapies to target pain relief, with the understanding that manual therapies have a limited impact on improvement in physical function.

IMAGES AND TABLES:

