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A PROSPECTIVE STUDY EVALUATING THE EFFECTS OF MANUAL THERAPY ON THE TREATMENT OF ANTERIOR KNEE PAIN

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SUMMARY
Knee joint pathologies, such as anterior knee pain (AKP), are associated with strength deficits and reduced knee extensor activation, which is referred to as muscle inhibition (MI). MI is the inability to recruit all motor units of a functional muscle group to their full extent during a maximal-effort voluntary contraction. MI is a concern to clinicians as it contributes to muscle atrophy, the development of arthritis, and increases the risk of re-injury. MI is also thought to prevent full recovery and manual therapy treatments that help to reduce or eliminate MI appear crucial for successful rehabilitation. Clinical observation suggests that certain manual therapy treatments are associated with improved muscle strength and reduction in pain. It is unknown whether manual therapy treatments contribute to improvements in knee-extensor strength and whether these treatments alleviate MI. Therefore the objective of this study was to evaluate prospectively the effect of a relatively new and commonly used manual therapy called, Myofasical Release Technique (MRT) on quadriceps muscle inhibition, knee pain, and knee extensor strength in physically active adults with AKP.

INTRODUCTION
Knee-joint pathologies, such as anterior knee pain (AKP) are in general associated with loss of strength and function of the knee-extensor muscles.[2,3,5,6,7,8] This muscle weakness has been attributed to muscle inhibition (MI), which is the inability to recruit all motor units of a functional muscle group to their full extent during a maximal-effort voluntary contraction.[9,10] MI is a concern to clinicians as it contributes to muscle atrophy, the development of arthritis, and increases the risk of re-injury.[4] The potential of MI to limit functional recovery of muscles and joints after injury has also been known, and it has been suggested that one of the early goals in the rehabilitation process should be to reduce or eliminate MI to achieve full recovery of the affected structures.[2] There is anecdotal evidence that patients afflicted with AKP can be effectively managed through manual therapy of the quadriceps muscles.[1,10] Improved subjective symptoms and increased knee-extensor strength have been reported after manual therapy.[10] This result prompts the question of whether manual therapy of the quadriceps directly affects knee-extensor inhibition. Therefore the objective of this study was to evaluate prospectively the effect of a relatively new and common type of manual therapy called, Myofasical Release Technique (MRT) on the quadriceps muscle inhibition, knee pain, and knee extensor strength in physically active adults with AKP.

METHODS
Eighteen patients with AKP were randomly assigned to one of three groups. Two composed of the manual therapy treatment groups and the third was a control group. The testing sequence is outlined in the flow diagram seen in (Figure 1). After a lower extremity orthopedic assessment by a sports physician, to confirm the clinical diagnosis of AKP, baseline (week 0) subjective knee pain scores (Visual Analogue Scale), isometric knee-extensor strength (Biodex machine), and MI during full effort muscle activation were measured. Then participants in the treatment groups received one of the following commonly used manual therapy techniques on the quadriceps muscles called Myofascial Release Techniques (MRT) or Trigger Point (TP). The TP treatment was included as a comparison to the MRT. The control group received a sham ultrasound treatment. The same outcome measurements were taken before and after the treatment interventions. There were a total of six treatment visits occurring at a frequency of three times a week for two weeks. Two follow-up visits were also included, each two weeks apart from one another, totaling a six-week study period for each participant.

MI was assessed by using the interpolated twitch technique.[10] Two electrical twitches (i.e., a doublet) were applied to the femoral nerve approximately 1 second after the subject reached the force plateau during the maximal isometric contraction. The magnitude of this interpolated twitch torque is representative of the amount of MI.[10] A resting twitch torque was measured for each participant as the torque produced by the relaxed quadriceps muscle when stimulated by the doublet twitch.[10] MI was calculated as the ratio between the interpolated twitch torque and resting twitch torque.[10]

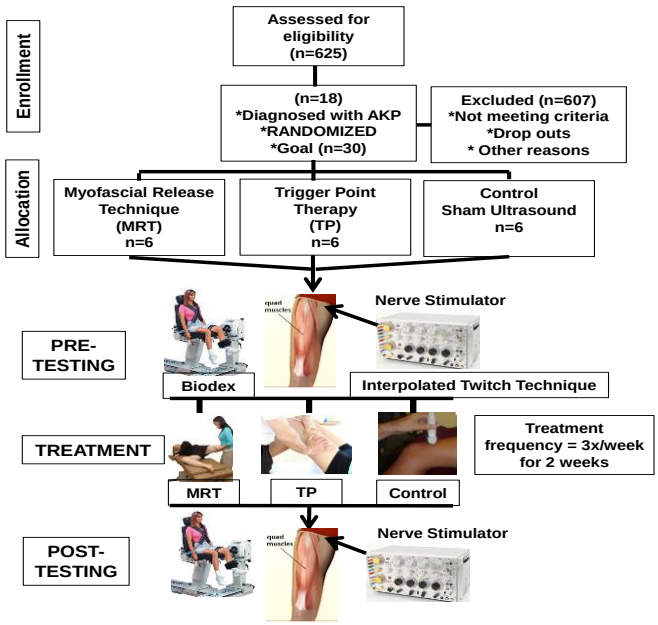

Figure 1: Flow diagram of the subject enrollment, allocation, pre-testing, treatment intervention and post-testing.

RESULTS

Values for knee pain, knee-extensor strength, and quadriceps MI are shown in figures 2-4 respectively. Pain decreased in all three groups and in terms of knee extensor strength or torque the two treatment groups showed an improvement whereas the control group did not. In terms of muscle inhibition the two treatment groups showed a trend in reduction whereas the control group did not.

DISCUSSION

The results appear to show some clinical benefit in terms of pain reduction from all treatment interventions. There are two possibilities why this occurred. Firstly the sham ultrasound did not do anything and therefore may have produced a placebo effect. Secondly the natural history or natural progression of the AKP may have been a factor in the pain reduction since it was a six week study period. Nevertheless the knee extensor torque and MI did improve throughout the study period and if this were true the current sample size may be too small to draw firm conclusions.

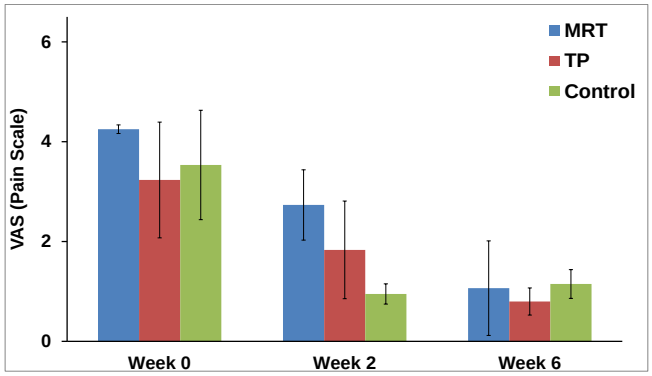

Figure 2: Knee pain (mean ± SE) on the visual analogue scale rated out of 10, with 10 being the worst pain imaginable. At baseline (week 0), 2 weeks & 6 weeks (n=18).

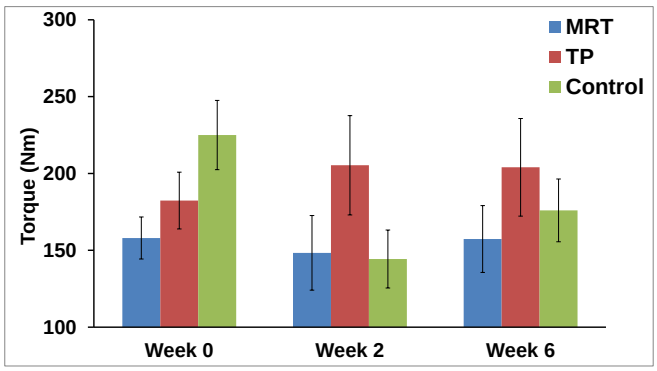

Figure 3: Knee extensor torque (mean ± SE). At baseline (week 0), 2 weeks & 6 weeks (n=18).

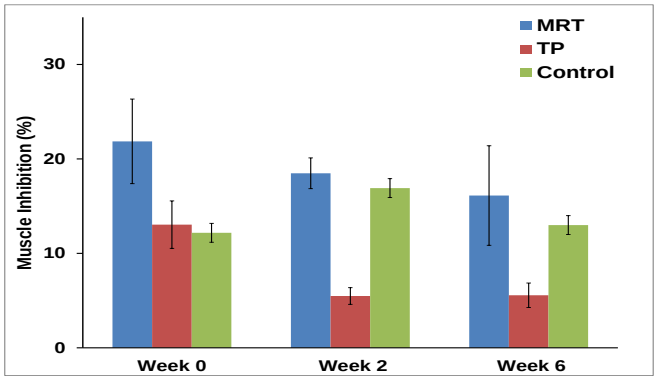

Figure 4: Quadriceps muscle inhibition (mean ± SE). At baseline (week 0), 2 weeks, & 6 weeks (n=18).

CONCLUSIONS

Decreases found in muscle inhibition were associated with reduced knee pain and increased knee extensor strength. This must be interpreted with caution since the control group showed similar improvements in knee pain. In conclusion the MRT & TP treatments showed improvement in all the study outcome measures; however a larger sample size will be required and is currently being analyzed to make firm conclusions.

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