ABSTRACT

**Background:** It is well known that eccentric and concentric exercise produce varied amounts of stress on the connective tissues. Diagnostic ultrasound has been used to measure these structural changes by observing fascicle length, angle, and thickness; however, there is a lack of evidence comparing the structural changes as it relates to eccentric, concentric, and stretching protocols.

**Purpose:** The purpose of this study was to compare the acute effects of static stretching, eccentric, concentric, and a combination of eccentric/concentric exercises on structural changes of the muscle tendon unit at the inferior patellar pole utilizing the diagnostic ultrasound.

**Study Design:** A repeated measures 2 x 4 within factorial study design with repeated measures on both factors was used to determine the differences in patellar tendon thickness within and between groups.

**Methods:** Forty-seven healthy subjects were screened for any lower extremity deficits or orthopaedic pathology. Forty-four (N = 44) subjects completed all four protocols; the attrition was due to injuries to the lower extremity, occurring unrelated to the study. A baseline measurement of the anterior inferior patellar tendon was performed with the diagnostic ultrasound prior to each participant completing one of the four interventions per week over a four-week period. Interventions completed by each participant included static stretching, concentric, eccentric, and combined concentric and eccentric exercises. Immediately following each intervention, a post-intervention inferior patellar tendon measurement was recorded using the diagnostic ultrasound.

**Results:** Significant differences in anterior to posterior tendon thickness of the inferior patellar tendon were observed between pre (4.983 ± 0.041mm) and post (5.198 ± 0.055mm) measurements (p < 0.0005) for the main effect of time. However, no differences in tendon thickness were noted comparing each intervention to one another (p = 0.351).

**Conclusion:** Differences in tendon thickness were noted acutely for pre- to post measurements across all interventions. Further research is needed to determine if differences in tendon thickness exist with a longer duration of exercise over time and with different types of intervention.

**Keywords:** Diagnostic ultrasound, inferior patellar pole, jumping, patellar tendon