ABSTRACT
NEUROMUSCULAR FUNCTION IN ACHILLES TENDINOPATHY

LAUREN K. SARA, DPT
MARQUETTE UNIVERSITY, 2021

Midportion Achilles tendinopathy (AT) is a chronic, painful condition of the long tendon that attaches the triceps surae muscle group (the soleus, medial and lateral gastrocnemius muscles, plantar flexor muscles) to the calcaneus bone. There is incomplete understanding of the underlying pathophysiology, pain, and role of plantar flexor function (strength and fatigability) in functional impairment in AT. Deficits in plantar flexor muscle function are assumed, but evidence is sparse and inconclusive. There is no understanding of whether people with AT have deficits in neural drive to the plantar flexor muscles or altered contractile function, or the role of pain in mediating plantar flexor function in AT. The purpose of this dissertation was to evaluate plantar flexor muscle function both in persons with AT compared to healthy controls and during a common clinical test, the Single-Leg Heel Raise.

The Single-Leg Heel Raise test (SLHR) is purported to measure plantar flexor muscle strength. Study 1 challenged this notion by comparing performance in this task to the torque produced during a maximal voluntary isometric contraction, a validated test for measuring maximal strength. The lack of associations between task performance and maximal strength suggest that the SLHR is not an indicator of maximal plantar flexor strength, but rather a measure of muscular endurance.

Deficits in plantar flexor strength, power and fatigability are assumed in persons with AT. Studies 2 and 3 investigated this assumption by measuring maximal isometric, and dynamic plantar flexor strength, SLHR repetitions, and isometric fatigability in AT and controls. There were no strength or fatigability differences between groups. However, contractile function was less in people with AT, and this was correlated with pain in the Achilles tendon.

Despite similar task performance, including plantar flexor strength and fatigability, contractile function may be impaired in AT, perhaps a result of pain mechanisms. Rather than emphasizing maximal strength and fatigability alone, an integrated approach, including interventions that address both chronic pain and impaired plantar flexor contractility, are necessary when treating people with Achilles tendinopathy.