Single Running Bout Achilles Tendon Stiffness Adaptations in Elite Male Runners with Various Foot Strike Patterns

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Category: Doctoral

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ABSTRACT

PURPOSE: Midfoot strike runners experience greater amounts of force through the Achilles Tendon while running compared with heel strike runners which may increase the risk of Achilles tendinopathy. The purpose of this study is to examine the effect of a five-mile running bout, on Achilles tendon stiffness as measured by elastography in elite male runners that exhibit a midfoot or heel strike pattern. **METHODS:** Ten male runners (age = 21.4 years, height = 179.54 cm, weight = 66.2 kg, average miles run over the last 6 weeks = 6) participated in this study. Runners free from injury and running at least 50 miles a week and able to run a 10k in 33:00 minutes participated. Prior to running participants were marked with permanent marker on the posterior aspect of the Achilles tendon in a straight line between the apex of the medial and lateral malleolus. The Achilles was imaged before running and after each mile until five miles. Running sessions were completed on an instrumented treadmill with 0% incline. Runners ran a standard recovery pace of 4.31 m/s. Between mile 3 and mile 4 study participants were filmed using a high speed digital camera to determine foot strike patterns at initial contact. Rear foot strike was classified as initial ground contact with heel or rear 1/3 of shoe, mid-foot strike was classified as initial ground contact with midfoot. **RESULTS:** Neither running group experienced significant changes in Achilles tendon stiffness from the initial measurement ($p>0.05$), despite an increase in Achilles stiffness of 23.68% and 30.92% in the midfoot strike and heel strike running groups respectively. There were no significant differences between the running groups at any of the measurement time intervals ($p>0.05$). A medium Cohen's D effect size (0.54) was found between groups at the mile 4 measurement. No significant differences were found in the rate of Achilles tendon stiffening between groups ($p=0.90$) **CONCLUSIONS:** Elite runners that midfoot strike and heel strike do not experience statistically significant Achilles tendon stiffness changes over a five mile run at a recovery pace. No initial differences in Achilles tendon stiffness existed between foot strike groups and heel strike runners and midfoot strike runners experienced similar Achilles tendon stiffness changes during the run.