
ACHILLES TENDON STIFFNESS OF FEMALE DIVISION 1 CROSS COUNTRY RUNNERS WHO USE ORAL CONTRACEPTIVES

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Background: Previous tendon research does not provide data on the Achilles tendon (AT) stiffness of Division 1 (D1) female cross country (XC) runners who use oral contraceptives (OC). Limited information is known about the effect of estrogen and progesterone on tendon stiffness in D1 XC athletes, with conflicting presumptions being that there is a decrease in tendon stiffness based off less inclusive data. A decrease in AT stiffness may have an impact on injury and performance in D1 female XC runners, therefore an investigation on the impact of OC is warranted. With the findings of decreased AT stiffness in athletes who use OC, coaches and clinicians may prophylactically prescribe tendon loading programs to minimize the potentially negative effects of decreased stiffness.

Purpose: The purpose of this study is to identify if there is a difference in AT stiffness among female D1 XC athletes who use OC and do not.

Study Design: Case-control Study

Methods: Twenty current D1 female XC runners volunteered from a midwestern university to participate in the study. Six of the 20 subjects use OC and 14 do not use OC. AT biomechanical measurements were collected bilaterally with the MyotonPro, a myotonometer, at the beginning of their XC season. The MyotonPro has been shown to have good to excellent intra-rater reliability and inter-rater reliability. Validity has been established against shear wave ultrasound elastography with construct validity being demonstrated as well. Per the manufacture's recommendations, the subjects were positioned prone with a bolster positioned anterior to their distal lower leg to allow a relaxed position for tendon measurements. The measurements were completed at the midline of the AT between the medial and lateral malleoli. The average of 6 measurements, 3 per tendon, were used to calculate the mean AT stiffness of each athlete.

Results: The mean AT stiffness of the OC users measured 664 N/m, while the nonusers measured 702 N/m. The results of an independent t-test indicate significantly lower AT stiffness of D1 female XC runners that use OC ($M = 664$, $SD = 23.35$) than those who do not ($M = 702$, $SD = 48.5$), $t(18) = -2.138$, $p = .033$.

Discussion/Conclusion: Female D1 XC runners who use OC have significantly less AT stiffness. Coaches and clinicians should consider a prophylactic AT loading program to minimize potentially adverse effects of OC use. Future research should examine how a prophylactic AT loading program impacts the AT stiffness, performance, and risk of injury.

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