Ultrasound evaluation of the effect of an endurance training programme on the thoracolumbar fascia of healthy adults

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Background: The thoracolumbar fascia increases its tension during trunk flexion, meaning it has a key biomechanical function. This study investigates whether endurance cycling can be used as a model to measure the impact of prolonged periods of flexion on the architecture of the thoracolumbar fascia. The purpose of this study is to investigate, using ultrasound imaging, the effects of a 4 week endurance cycling training programme on the thickness and echogenicity of thoracolumbar fascia.

Methods: The study was approved by the University of Kent’s Research Ethics Committee (SSESProp 124-2015-16). The study design was quasi-experimental, the intervention cohort consisted of fifteen untrained participants (mean age 26, SD 7.5. 87% male) recruited from a pre-existing endurance training study [1], the control group was comprised of fourteen untrained participants (mean age 22, SD 2. 21% male) recruited through opportunistic sampling. Both groups were matched at baseline for body mass (p = 0.10) and physical activity levels (p = 0.43), but not for age (p=0.04) and gender (p=0.01). The training consisted of endurance cycling sessions four times a week, over a period of 4 weeks on a stationary cycling ergometer. Participants alternated between 60% and 100% of their peak aerobic power. The mean total training time ranged between 8 and 16 hours. Longitudinal ultrasound images of the thoracolumbar fascia were taken, bi-laterally, between lumbar vertebral levels 2 and 3, at baseline and 4 weeks later. Data were analysed using two-way repeated measures ANOVA tests.

Results: There was no statistically significant change in the thickness and echogenicity of thoracolumbar fascia after 4 weeks of endurance cycling training ($F (1,27) = 0.53$, $p = 0.47$ and $F (1,26) = 2.21$, $p = 0.15$ respectively).

Conclusion: This study found no significant differences in the thickness or echogenicity of the thoracolumbar fascia after a 4 week cycling training programme, compared to a control group. This could be due to the large inter-individual variability in training time (8-16 hours), or the type of mechanical stimulus. Future studies should investigate longer, more homogeneous training periods, using matched randomised cohorts. Additionally, different types of loading such as resistance training should be investigated.
Figure: Mean and standard deviation of thoracolumbar fascia thickness in mm

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