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A Comparison of Foot Strengthening versus Minimal Footwear Use on Intrinsic Muscle Size and Strength

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Category: Other

Keywords: intrinsic foot muscles, extrinsic foot muscles, strengthening, footwear

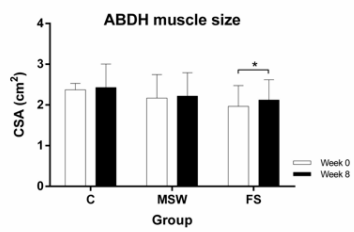
Introduction/Purpose: The intrinsic muscles of the arch have been classified as the core of the foot. Intrinsic foot muscles (IFM) work as local stabilizers and extrinsic foot muscles (EFM) work as global movers to help control the pronation of the foot. These muscles prevent excessive strain of the MLA. Previous research has shown that strengthening IFM may reduce pain and improve function in people with plantar fasciitis. Additionally, habitual use of minimal shoes that lack support of the arch require greater demand on the intrinsic muscles. The purpose of this study was to determine the effectiveness of two different strengthening interventions on IFM and EFM size and strength.

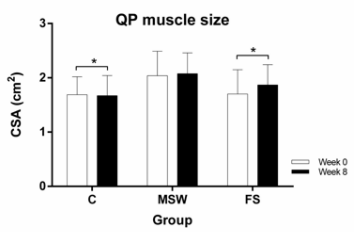
Methods: 57 healthy runners (avg 15-30 mpw) were randomly assigned to a foot strengthening (FS, n=19), a minimal shoe walking (MSW, n=19), or a control group (C, n=19). Baseline cross-sectional areas of abductor hallucis, quadratus plantae, flexor digitorum brevis, and flexor digitorum longus, and thickness of the flexor hallucis brevis, tibialis posterior, and tibialis anterior were obtained with ultrasound using a 10 MHz linear probe. Doming, great toe flexion and lateral toes flexion strength were also measured using a custom-built dynamometer. The FS group then underwent an 8 wk foot and ankle strengthening program. The MSW group progressively walked in minimal footwear from 2,500-7,000 over the course of 8 wks. All groups, including C, maintained normal running mileage in conventional footwear throughout the 8 wks. Size and strength measures were then repeated. A repeated measures ANCOVA with a post-hoc test was used to determine differences in size and strength between groups.

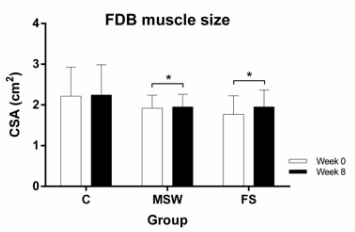
Results: All muscles measured in the FS and MSW groups increased significantly in size from weeks 0-8. There were no changes in muscle size in the C group. The FS group experienced significantly greater size changes for the flexor hallucis brevis than the MSW group. All other changes in muscle size were not significant between the FS and MSW groups. The FS and MSW groups showed significant increases in strength in all 3 tests from week 0-8. Strength of the control group did not change at any time. The increases in strength in the FS and MSW groups were not significantly different than each other.

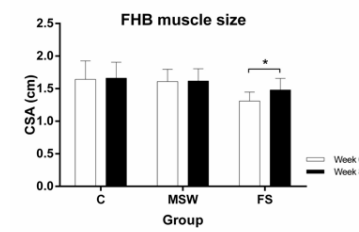
Conclusion: Exercises that target the intrinsic and extrinsic foot muscles are effective in increased strength and size of the muscles. However, similar increases in strength and size can be obtained by progressive walking in minimal footwear. Combining both these approaches may have an even greater effect. Stronger feet may offer greater protection against overuse injuries such as plantar fasciitis.

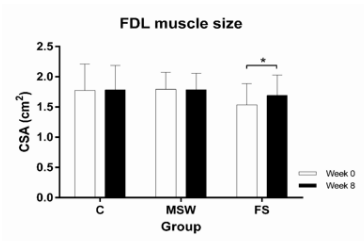
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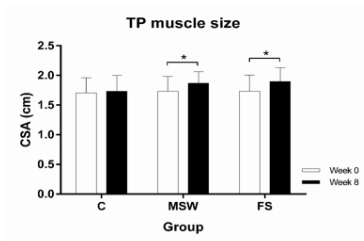


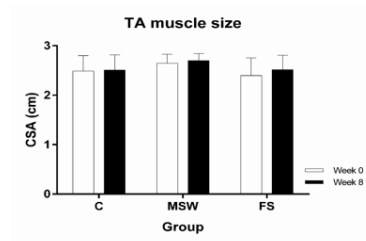


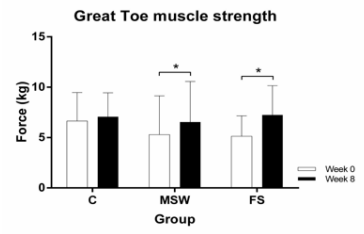


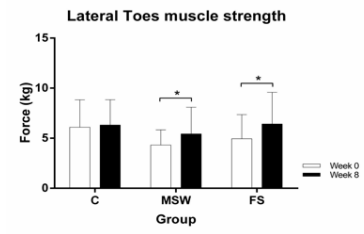


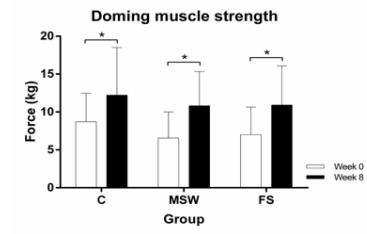












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