

The Effect of Barefoot Running on EMG Activity in the Gastrocnemius and Tibialis Anterior in Recreationally Active College-Aged Females

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Abstract:

Running is one of the most popular forms of exercise, yet overuse injuries such as plantar fasciitis, shin splints, and tibial stress fractures are unusually common. Barefoot/forefoot running has shown promise to reduce overuse injuries by decreasing the impact upon contact with the ground. The arch of the foot utilizes a 'spring' system that simultaneously reduces impact values and propels the stride forward. Increased muscle activity in a particular location is indicative of greater impact forces, suggesting a larger risk for overuse injuries. The current study investigated the role of the barefoot condition on electromyography (EMG) activity in the tibialis anterior (TA) and the lateral gastrocnemius head (GAS) in recreationally active college-aged females when forefoot striking. It was hypothesized that TA activity would decrease and GAS activity would increase in the barefoot condition. 17 healthy and active female participants 18-23 years old were recruited for this study. Participants ran on a treadmill for 10 minutes in shod and barefoot conditions at 9 km/h and 1% incline. Paired t-tests were used to compare EMG values

between shod and barefoot conditions for each muscle. A significant increase of 3% of maximum voluntary contraction (% MVC) was recorded in the TA in the barefoot condition ($p=0.04$). There was a trending, though non-significant, increase of 3% MVC in GAS activity in the barefoot condition ($p=0.056$). Barefoot/forefoot running is not recommended for this population due to the potential increase in overuse injuries, particularly shin splints and tibial stress fractures.