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INFLUENCE OF FOOTWEAR ON F-v PROFILE IN SPRINT ACCELERATION

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INTRODUCTION:
The first steps of sprint demand a high propulsive force, playing a key role in performance. The use of different shoes can directly influence the application and orientation of the force applied onto the ground at the foot. We aimed to compare the force-velocity profile during sprint acceleration between wearing sprint spike shoes versus wearing conventional (marathon) shoes.
METHODS:
For this study, 24 national and regional level male trained sprinters with age 22.0 ± 3.8 years, stature 178.0 ± 5.9 cm, body mass 73.3 ± 6.7 kg and 100 m time of 11.06 ± 0.40 s were evaluated. Ethics approval was obtained from the Universidade Federal do Rio Grande do Sul (Protocol: 73415817.5.0000.5347). After a 30 min warm-up (10 min of running, stretching and 5 accelerations of 30 m), the sprinters performed four 30-m sprints at their maximum intensity with a 5-min interval between attempts, 2 of them using spike shoes and 2 with conventional shoes in a randomized order. For data collection, a smartphone (iPhone 7+) was positioned on a tripod in the sagittal plane at 10 m from the running track (15 m from the start) and 1 m high. All tests were filmed at a sampling frequency of 120 Hz and the split times were determined at 5, 10, 15, 20, 25 and 30 m using the MySprint app (Apple Inc., USA) for further analysis of the variables: 30 m time (t30m), maximum speed, maximum theoretical speed, maximum theoretical horizontal force, maximum power, peak ratio of force and its decrease, and force-velocity profile slope. We quantify the magnitude of the difference between the two conditions using Glass's delta (Δ) and the following classifications: null (< 0.1), very small (0.1 to 0.19), small (0.2 to 0.49), medium (0.5 to 0.79), large (0.8 to 1.19), very large (1.2 to 1.9), and huge (over 2.0).
RESULTS:
The sprinters improved the t30m (Δ = -1.15, large) using spike shoes (4.20 ± 0.10 s) in comparison to conventional shoes (4.35 ± 0.13 s). Similarly, the sprinters improved the physical qualities using spike shoes compared to conventional shoes, resulting in an improvement in maximum velocity (Δ = -0.24; small) of 0.11 m/s and maximum theoretical velocity (Δ = -0.16; very small) of 0.08 m/s, as well as maximum horizontal force (Δ = -1.75; very large) and maximum power (Δ = -1.67; very large). The slope of the force-velocity profile (Δ = 0.80; large) increased from spike shoes to conventional shoes by about 13%. Also, using spike shoes improved mechanical effectiveness with a peak and decreasing rate in the force ratio of 11% (Δ = - 2; huge) and 8% (Δ = 1.14, large), respectively.
CONCLUSION:
We can conclude that spike shoes significantly influence sprint performance and mechanical effectiveness. Theoretical force and maximal power are the physical quality variables most relevant to these changes.

Topic: **Biomechanics**

Presentation **Oral**