Effects of Footwear on Performance in a Barbell Backsquat

ANTHONY WILKINS, SCOTT P. MCLEAN, and JIMMY SMITH

Kinesiology Department; Southwestern University; Georgetown, TX

Category: Undergraduate

Advisor / Mentor: McLean, Scott (mcleans@southwestern.edu)

ABSTRACT

Varying philosophies exist on the type of footwear that is most beneficial to wear when strength training. Olympic/power lifters prefer to train in a stiff shoe with a raised heel (0.6-0.75 inches) to provide more stability through the movement. Bodybuilders prefer lifting barefoot or with a minimalist shoe. The purpose of this experiment was to determine the effects that a weightlifting shoe has on peak vertical force, peak vertical power, total center of pressure migration (COP), anterior-posterior (AP) COP migration, and mediolateral (ML) COP migration. Eleven participants, (178.7±7.2 cm and 84.6±15.3 kg) performed barbell back squats while wearing a weightlifting shoe and a running shoe with a minimal drop height. All trials were performed atop a force plate with force and moment data collected at 200 Hz. Participants reported on three separate days for testing. Day one was used to determine 1-RM using a multi-rep test (Brzycki, 1993). Participants then were given 48 hours rest before reporting for the next day. Days two and three were used to collect data kinetic data from a submaximal (70% 1-RM) squat trial while wearing either a weightlifting shoe or running shoe. The same 48 hours rest was given between the two days. Peak vertical force while wearing weightlifting shoes (2096±449 N) was not different than when wearing running shoes (2086±486 N) (t_{32} = .154, p=.87, d=.015). Similarly, peak vertical power while wearing weightlifting shoes (30.7±19.6 W) was not different than when wearing running shoes (31.1±23.4 W) (t_{32} = .12, p=.9, d=.01). Wearing running shoes decreased total migration of the COP (0.61±0.18 m) by 34% from the weightlifting shoe (0.93±0.67 m) (t_{32} = 2.82, p=.008, d=.45). Likewise, AP COP migration wearing the running shoes (0.35±0.13 m) was reduced by 51% compared to using the weightlifting shoe (0.71±0.73 m) (t_{32} = 2.96, p=.005, d=.47). As indicated by Cohen’s d, approximately 45% of the reduction in COP migrations was accounted for by shoe type. These data suggest that use of a flatter, less stable shoe resulted in more stable body position throughout the squat exercise. Less body sway during the movement may produce a more effective lifting technique that minimizes the risk of injury.