

Effects of Footwear on Performance in a Barbell Backsquat

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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.

