TACSM Abstract

Effect of Height on Power Output During Sprint Stair Running

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ABSTRACT

Anaerobic power can be measured by the Margaria-Kalamen Power test , which requires individuals to sprint up 12 stair-steps while striding three stair-steps (MK3) at a time which is challenging for shorter individuals. **PURPOSE:** to determine if there is a difference in the power output during the MK3 and a modified test requiring only 2 steps per stride (MK2) in males and females who were shorter than 168 cm (ST) and those who were 168 cm or taller (TL). **METHODS:** All participants performed 3 tests in random order. A modified Wingate test lasting 5s (WG5) against a resistance equal to 7.5% body mass on electronically braked cycle ergometer (Velotron) was performed as a control trial to determine anaerobic power. All participants also performed the MK3 and the MK2. Participants sprinted six meters on flat ground and then ascended a staircase as fast as possible. Participants took 4 strides to climb 12 stair steps during the MK3. Participants took 4 strides to climb 8 stair steps during the MK2. The time to climb from stair step 3 to 9 during the MK3, and from stair step 2-6 during the MK2, was determined by using the average of two times. One investigator was located at the bottom of the stairs and the other investigator was at the top of the stairs using handheld stopwatches. A 2 (height) x 3 (trial) repeated measures ANOVA was performed to determine significant differences. The criterion reference for significant differences was set at $p<0.05$. **RESULTS:** Participants in the ST group were 62.2±10.8 kg, and 161.4±5.6 cm tall, and participants in the TL group were 82.1±7.2 kg, and 175.1±9.0 cm tall. Absolute power (MK3 1499±262 vs 938±190W; MK2 1239±138 vs 802±142W; WG5 1007±103 vs 645±150W) and relative power (MK3 18.2±2.3 vs 15.2±2.8W/kg; MK2 15.1±.8 vs 12.9±1.1W/kg; WG5 12.5±.5 vs 10.3±1.2W/kg) were significantly greater ($p<.05$) in TL compared to SL in each test. In both TL and ST groups for absolute power and relative power, there were significant differences ($p<.05$) between all three tests (MK3>MK2>WG5). **CONCLUSION:** Taller individuals may be able to produce more power, both absolute and relative, than shorter individuals during sprint stair running. Absolute and relative power produced during stair running may be greater than power output during the first 5 s of a Wingate test.