Poster Presentations

Comparison of an air- and electronically-braked ergometer in the assessment of anaerobic power and capacity.

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Introduction: Anaerobic power and capacity have been predominantly determined via the 30-second Wingate test using a mechanically-braked ergometer. However, air-braked (AE) and electronically-braked (EE) ergometers have also been utilised to assess anaerobic power and capacity. Subsequently, the aim of this study was to examine the influence of ergometer type (AE vs. EE) on the determination of anaerobic power and capacity.

Methods: Fourteen healthy adults volunteered for this study and provided written informed consent in line with institutional ethics approval. In a random order, and separated by at least 7 days, participants completed a 30-second anaerobic cycle test using an AE (Repco, Australia) and an EE (Lode, Netherlands) in line with the established Wingate test (7.5% body mass). Peak and mean power, total work, fatigue rate, peak heart rate (HR) and rating of perceived exertion (RPE) were determined during the tests. Data were analysed using paired t-tests or Wilcoxon signed-rank tests, where appropriate.

Results: Peak HR (182 ± 12 vs. 184 ± 10 bpm) and RPE (18.6 ± 2.0 vs. 18.6 ± 2.0) were similar between tests. Peak power, mean power, total work and fatigue rate were significantly greater for AE compared to EE ($p<0.001$) with the mean difference being 51.6 ± 9.5%, 32.2 ± 6.6%, 32.2± 6.6% and 69.3 ± 19.8%, respectively.

Conclusions: The current study demonstrated that anaerobic power and capacity were substantially greater when assessed using AE compared to the EE. Ergometer type should be considered when comparing anaerobic power and capacity results across populations and/or studies.

Differences in the kinematics of the baseball swing between bats of varying mass.

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Introduction: Literature suggests that it is common practice for baseball hitters to use bats of varying mass during warm-up, training and games. However, research has not described the kinematic changes in swing pattern that occur when using bats of varying mass.

Methods: Twenty sub-elite male baseballers participated in the study. Three baseball bats of equal length (0.838m) and varying mass (Bat_1 = 0.795kg, Bat_2 = 0.847kg, Bat_3 = 0.943kg) were used. Each subject performed 10 maximal swings with each bat at a ball on a hitting tee replicating a line drive. Infrared cameras obtained high speed three-dimensional data to quantify the biomechanics during the baseball swing. One-way ANOVA was used to determine kinematic differences between conditions.

Results: The results showed a difference in maximum bat swing velocity ($p<0.01$) between Bat_1 (36.0$m.s^{-1}$) and Bat_3 (34.4$m.s^{-1}$). Resultant ball velocity was 17% higher using Bat_1 compared to Bat_3 ($p<0.05$). Subject head movement was lower using Bat_1 (8 cm) when compared to Bat_3 (10 cm). Maximum linear left hip velocity was significantly higher ($p<0.01$) when using Bat_3 compared to other bats. In contrast, maximum linear right hip velocity was lower ($p<0.01$) when using Bat_3.

Conclusions: This study has identified aspects of the baseball swing that differ when using bats of varying mass. Notably, a relationship exists between bat mass and hip velocity which could be a potential mechanism for underlying training effects previously noted. Further studies are needed to determine acute and longitudinal kinematic effects of using bats of varying mass.