A Comparison Between the Wingate Anaerobic Test and Right Knee Extension Power

Author: Sarah Beckman, KINE 4400
Sponsors: Judy R. Wilson, Ph.D. Mark D. Ricard, Ph.D.
Cardiovascular Research Laboratory, Biomechanics Research Laboratory, The University of Texas at Arlington, Arlington, TX

Abstract

The purpose of this study was to examine the differences and similarities of the Wingate anaerobic power test (WAnT) and right knee extension power as measured on the Biodex dynamometer.

Methods

Six males (age 22.4 ± 1.13 years) of the UTA Kinesiology department, volunteered to participate in this study. Each subject had their height and weight recorded and body mass index (BMI) calculated. Equipment for this experiment included a Lode ergometer. On one day, each subject was first verbally familiarized with the Wingate test and the ergometer. The resistance for the ergometer was predetermined by each subjects’ body weight. Each subject started with a one minute low resistance warm-up on the ergometer after which the 30 Wingate test immediately followed. They were instructed to “pedal as fast as they can for the entire 30 seconds with maximal force”. During each test peak power (PP), mean power (MP), relative peak power (RPP), and relative mean power (RMP) (watts) were obtained from the ergometer for each subject. On a separate day, each subject also performed a right knee concentric extension test on the Biodex System 3 Dynamometer. Each subject was then verbally familiarized with the Dynamometer. They were then told to sit in the Biodex chair upon which the seat and leg apparatus was adjusted according to the size and leg length of each participant. The participant was to listen for the command “Ready, GO” and then “GO” he was to perform a concentric knee extension at maximal force. The participant performed three trials, from which the best trial was taken and recorded. Measurements were performed at an angular velocity of 360 deg/sec during which the angular power was obtained and used in further calculations to arrive at power in watts.

Results

The Wingate values for peak power was 569.4 ± 72.8 watts, and the Biodex values for peak leg extension power was 343.6 ± 194.6 watts, which showed a significant difference (p = 0.048). The Wingate values for relative peak power was 8.5 ± 2.6 watts, and the Biodex values for relative peak power was 5.3 ± 2.3 watts, a difference that approached significance (p = 0.058). Wingate values for relative mean power was 7.2 ± 0.9 watts, and the Biodex values for relative mean leg extension power was 4.1 ± 2.1 watts, which showed a significant difference (p = 0.039). Correlation results indicated little or no relationship for peak power, mean power, and relative peak power; and a moderate inverse relationship for relative mean power (r = - 0.51).

Conclusions

The results of this study indicate that there is a statistical difference between Wingate anaerobic power and right knee extension power. This was not unexpected due to the large difference in muscle mass involved in each of the measurements.