



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

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Abstract

INTRODUCTION: Anaerobic power is maximal power developed during utmost, short term physical effort. Anaerobic activities use energy that is stored in muscles and that can be accessed without the use of oxygen. Power is measured in watts (W) and relative power is measured by watts per kilogram of body weight (W/kg). Research shows that there are correlations between Wingate power and other anaerobic activities such as field tests, vertical jumping, and cycling tests.

PURPOSE: 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 3 Dynamometer.

METHODS: Six males (age 22.4 ± 1.13 yrs) 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. Each subject performed one 30 second Wingate test on the Lode cycle ergometer. During each test peak power (PP), mean power (MP), relative peak power (RPP), and relative mean power (RMP) for each subject were obtained from the ergometer. Each subject also performed a right knee extension test on the Biodex System 3 Dynamometer. Measurements were performed at an angular velocity of 360 deg/sec during which the angular power was obtained and used in other calculations.

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 mean power was 731.33 ± 110.5 watts, and the Biodex values for mean leg extension power was 438.9 ± 236.5 watts, which also showed significance ($p = 0.044$). The Wingate values for relative peak power was 8.5 ± 1.2 watts, and the Biodex values for relative peak power was 5.3 ± 2.6 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 ($r = -0.51$).

CONCLUSION: 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.

Purpose

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 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

Methods (cont'd)

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 first 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 on “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.

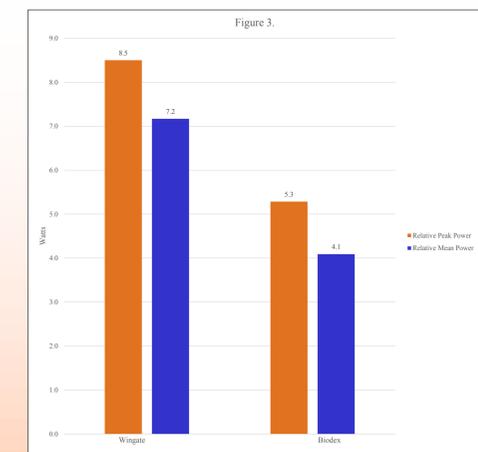
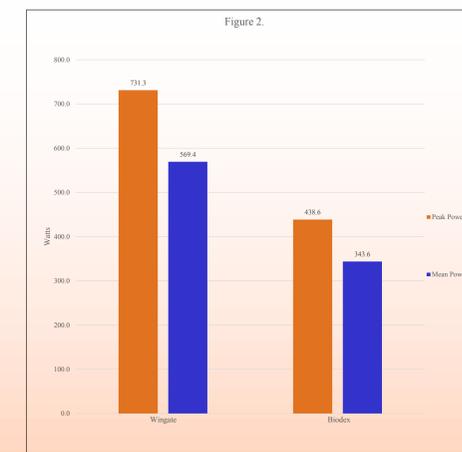
Age (years)	22.2 ± 0.98
Height (m)	1.80 ± 0.07
Weight (kg)	83.33 ± 9.62
Body Mass Index	25.90 ± 3.26

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 mean power was 731.33 ± 110.5 watts, and the Biodex values for mean leg extension power was $438.9 \pm$

Results (cont'd)

236.5 watts, which also showed significance ($p = 0.044$). The Wingate values for relative peak power was 8.5 ± 1.2 watts, and the Biodex values for relative peak power was 5.3 ± 2.6 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.