Establishing the Learned Effect of Repeated Wingate Anaerobic Tests

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ABSTRACT

Purpose: The purpose of this study was to establish the number of WAnT trials needed to identify a learned effect during repeated anaerobic ergometer testing.

Methods: This study tracked the changes in Peak Power (PP) and Mean Power (MP) in the WAnT, over 5 separate trials with a minimum of 72 hours between each trial. Resistance for trials was calculated at 7.5% of each respective subject’s weight.

Subjects: Sixteen apparently healthy college-aged males (n=11) and females (n=5) participated in five trials of 30-second cycle ergometer sprints.

Results: Paired samples t-test revealed PP increased on trials 2-5, when compared to trial 1 (+35W, +41W, +41W, +23W; p=0.03, p=0.07, p=0.07, p=0.33 respectively for both genders) and indicated peak wattage at trial 3 for 70% of male subjects.

MP increased on all trials (2-5) when compared to trial 1 (+26W, +36W, +33W, +35W; p=0.01, p=0.01, p=0.00, p=0.01, respectively), demonstrating mean peak wattage at trial 3 for 70% of male subjects. No discernable trends were found in MP and PP for female subjects. Only one female elicited PP and MP at trial 3.

Conclusion: These results suggest that a learning effect is present within PP and MP, until the third trial of the WAnT in male subjects. It is important to note that 4 of the 5 females tested elicited peak power before trial 3. Thereby, suggesting that when performing WAnT, utilizing less that 3 practice trials might elicit significant power increase in male subjects due to this learned effect. Further research should be conducted in order to support the findings from the present investigation and to further elucidate possible gender differences.

INTRODUCTION

The Wingate anaerobic test (WAnT) is a recognized and well established tool used to measure power output, muscular endurance, and fatigue. While literature involving the WAnT is plentiful, research addressing training effects within the WAnT is limited.

Previous studies have addressed changes in power output during repeated trials, however, to our knowledge multiple repeated trials over time to establish optimal learned effect has not been addressed. Past published study using WAnT have incorporated various familiarization trials to account for the learned impact on performance (1,2,4). If an optimal number were established to produce a learned response, the validity of future WAnT research may be improved.

METHODS

• Informed consent and health status questionnaires were completed before trials.
• Anthropometric data was obtained.
• Physical Activity and nutritional intake was reported and subjects were asked to replicate throughout the duration of research.
• Male (n=11) and female (n=5) subjects were familiarized with equipment and procedures.
• 2-min warm-up with 1 Kg resistance was applied at a self-selected cadence.
• 7.5% of body weight was then added to an unloaded basket for each of the 5 trials.
• 5-sec count down was given to subject’s in order to achieve the highest RPM possible before testing commenced.
• Test duration was 30-sec in length, with standardized verbal encouragement provided.
• Cool down period mimicked warm-up until subject’s ventilatory and cardiac responses returned to near resting level.
• The aforementioned procedures were repeated for all 5 trials with 72 hrs of recovery between trials.

RESULTS

Paired samples t-test using 2 tails revealed PP increased on all trials (2-5) for both genders when compared to trial 1 (+30W, +41W, +41W, +23W; p=0.03, p=0.07, p=0.07, p=0.33). Mean values for males and females are as follows: (874±151, 931±180, 943±134, 942±162, 922±153) (433.0±476.72, 442.5±52.54, 439.67±54.39, 447.72±61.33, 472.45±44.04) respectively. Peak wattage for males and females was seen at trial 3 and 1 respectively.

The percent change in PP over all of the trials for both genders (2-5) are as follows [4.9%, 5.3%, 5.2%, 2.9%], when compared to trial 1. MP also increased on all trials for both genders (2-5) when compared to trial 1 (+26W, +36W, +33W, +35W; p=0.01, p=0.01, p=0.00, p=0.01). Mean values for males and females are as follows (644±95, 675±95, 692±81, 683±86, 675±95) (594.2±78.27, 594.3±68.47, 574.14±59.33, 576.05±76.68, 559.92±69.93) respectively, demonstrating mean peak wattage for males and females at trial 3 and 5 respectively.

SUMMARY & CONCLUSIONS

• The purpose of the present study was to establish an optimal number of WAnT trials that would elicit a learned effect during anaerobic ergometer testing.
• The data presented indicated the largest percent change in PP (7.3%), when trial 1 was compared to trial 3. PP was highest on trial 3.
• The data presented indicated the largest percent change in MP (7.1%), when trial 1 was compared to trial 3. MP was highest in trial 3.
• Present research suggests that to account for any changes attributable to neuromuscular power output, 3 trials are needed during WAnT.
• Further research (i.e. larger sample, gender differences) is necessary in order to support these findings.

REFERENCES