The Effects of Anaerobic Fatigue on Reaction Time as it Relates to Cognitive Function

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Abstract

Purpose: The purpose of this investigation was to compare baseline complex reaction time tests with comparative complex reaction time tests in response to fatigue as a result of maximal anaerobic effort exercises. Reaction time was recorded immediately following the two maximal anaerobic effort exercises. Data was collected to determine how the cognitive functions of the body reacted to maximal anaerobic effort exercise tests.

Methods: 20 healthy male varsity (Age=20 yrs ±2 yrs) athletes participated in a single-blinded study. A familiarization session was conducted and consent provided. All subjects performed the familiarization session and the two anaerobic fatigue tests (Wingate & Bosco) within 72 hours. Subjects also performed 3 reaction tests, 1 baseline test, and 1 reaction time test following each fatigue test (each reaction time test consisted of 5 trials).

Results: Two Paired-Sample T-Tests showed no significant difference between Baseline and Post-Wingate (p=0.07, Baseline=311.8 ms±40 ms, Post-Wingate=303.3 ms±42.7 ms (Chart 1)), yet decrease between Baseline and Post-Bosco (p=0.01, Baseline=311.8 ms±40 ms, Post-Bosco=289.6 ms±45.9 ms (Chart 2)) was significant.

Conclusion: Results from the fatigue tests revealed that anaerobic fatigue doesn't negatively affect reaction time, thus not impairing cognitive function. An athletes' medical staff may use this data to analyze an athlete under anaerobic fatigued conditions and determine, based on their reaction time, if the athlete has any underlying issues in relation to cognitive function. However, because one fatigue test produced such a higher level of significance, future testing may be needed to determine which test produces more adequate anaerobic fatigue.

Methods

For their first appointment, all subjects arrived at the Biokinetics Metabolics Lab to complete an informed consent and to be familiarized with the Moart testing equipment along with the protocols for the Wingate and Bosco Anaerobic Fatigue Tests. Also, 8 trials of the reaction time test were taken for baseline purposes.

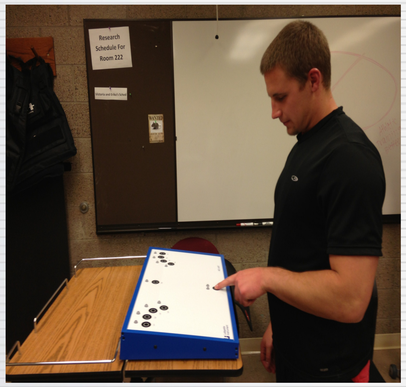
At their second appointment, they performed a 5 minute warm-up on a cycle ergometer (Monark). Immediately following the warm-up, the Wingate test began and the athlete pedaled as fast as they could for 30 seconds. This is a maximal anaerobic effort test and discomfort should have been felt. After a limited recovery following the test, each subject performed 8 trials of the reaction time test. After all reaction time tests were completed, the subjects were allowed sufficient time to recover.

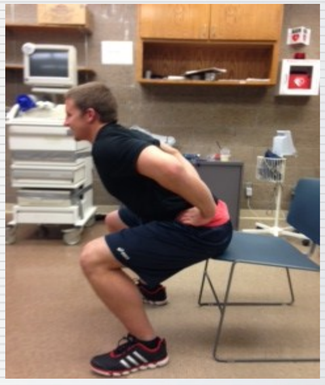
At their third appointment, the same protocol was used for the warm-up. The Bosco test was utilized as the second test and it consists of counter-movement jumps for 60 seconds, with as many repetitions as the subject can execute (with proper protocol technique). After limited recovery following the testing period, each subject performed 8 trials of the reaction time test. After all reaction time tests were completed, the subjects were allowed sufficient cool down time.

Introduction

One of the fundamental training purposes that strength/conditioning coaches have today is to train their athletes to their maximal anaerobic effort to try and increase performance on the field, court, etc… What often doesn't get taken into account during this training is the cognitive function of the athlete following the training. While training athletes up to their maximum anaerobic effort may provide physical gains down the road, it could also provide mental losses as well.

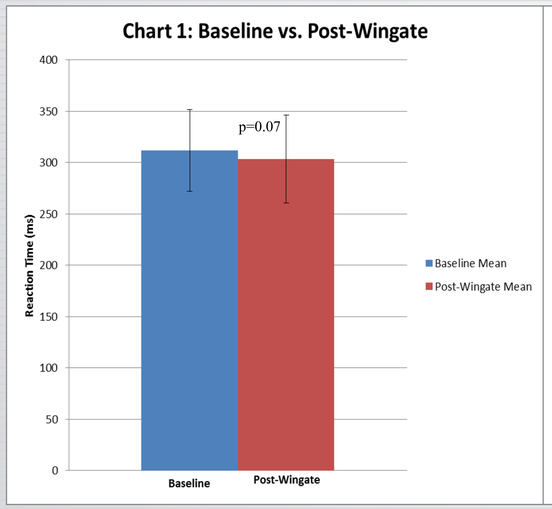
The purpose of this investigation was to compare baseline complex reaction time tests with comparative complex reaction times in response to fatigue as a result of maximal anaerobic effort exercises. Reaction times were recorded following two maximal anaerobic effort exercise tests. This data was collected to determine if the cognitive functions of the body react similarly with different maximal anaerobic effort exercises and how they react before and after exercise.

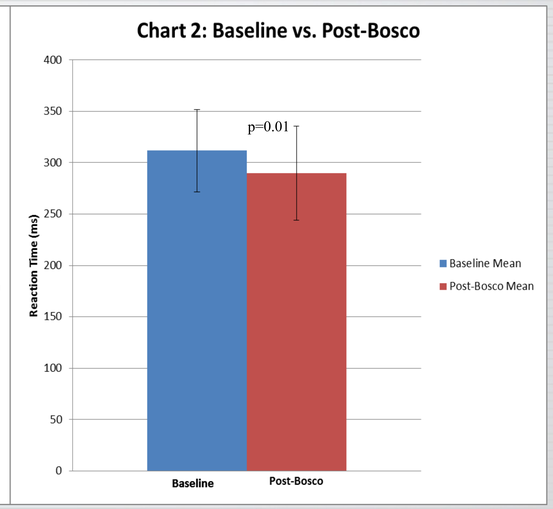




Results

Baseline vs. Post-Wingate (Chart 1): No significant difference was found between the Baseline reaction test times and the Post-Wingate reaction test times (p=0.07, Baseline=311.8 ms±40 ms, Post-Wingate=303.3 ms±42.7 ms).
Baseline vs. Post-Bosco (Chart 2): A significant decrease in reaction time was found between the Baseline reaction test times and the Post-Bosco reaction test times (p=0.01, Baseline=311.8 ms±40 ms, Post-Bosco=289.6 ms±45.9 ms).





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