THE EFFECT OF LACTATE BUILDUP AS AN ENERGY SUBSTRATE DURING A SHORT-DURATION, HIGH-INTENSITY RUN OF 400-m AND A MEDIUM RUN OF 800-m ON UTA KINESIOLOGY STUDENTS

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Introduction

Lactic acid is a metabolic byproduct of the anaerobic glycolysis energy system present in blood and muscle. Some research indicates that lactic acid is a marker of fatigue during short duration exercise due to its dissociation into lactate and the H⁺ ion, whose accumulation in tissues and blood can lead to a subsequent decrement in muscle and plasma pH causing an inhibition of coupling mechanisms and enzymatic processes necessary for maintenance of muscular force production. Other studies have not implicated lactate to be the sole contributor of fatigue, as different types of exercise produce multifaceted fatigue factors, depending on muscle fiber type composition, intensity and duration of exercise and degree of fitness of the individual. A higher lactate production has been previously associated with better performances at the onset and during short duration, high-intensity exercise or competition, and its ability to possibly offset effects of fatigue.

Methods

PROCEDURE

- Upon arrival subjects filled out a general health and activity questionnaire and were asked not to consume any food or caffeine 2 hours previous to workout
- Subjects ran 400-m on day 1 and 800-m on day 3, and were instructed not to participate in any physical activity on or between those days
- A resting blood lactate level, heart rate and blood pressure value were obtained before each run
- Blood lactate level, heart rate, blood pressure, were obtained as well immediately at completion of each run, and 5 minutes post-run during recovery time.
- Rate of Perceived Exertion (RPE, Borg Scale 0-16) was obtained immediately at completion of each run

Results

- NULL HYPOTHESIS: There is no significant difference in blood lactate buildup and time to completion in either the 400-m or 800-m run.
- Independent variable
  - 400-m blood lactate
  - 800-m blood lactate
- Dependent Variable
  - Time to completion of run
  - Heart Rate
  - Blood pressure
  - Rate of perceived exertion (RPE)
- A correlation measures statistical analysis was used
- The P-value was set to .05
- The data was analyzed using the SPSS 17.0 software

- There was a high, inverse correlation in blood lactate buildup in 400-m (mean 13.9 mmol ± 2.4 mmol) and 800-m (13.7 ± 2.7 mmol) and time to completion of each event (mean 97.23 ± 17.55 sec, r=−.814, P=.014, P=.005) and (mean 230.11 ± 44.20 sec, r=−.860, P=.006, P<.01), respectively.
- In terms of lactate buildup and its relationship with HR (163 ± 21 bpm [400-m]; 168 ± 16 bpm [800-m]), BP (161/66 ± 14/16 SBP/DBP [400-m]; 169/61 ± 13/19 SBP/DBP [800-m]), and max RPE (15 ± 1 [400-m]; 15 ± 1 [800-m]), no significant differences were observed.

Conclusions

These results indicate that a higher blood lactate build up is associated with a better performance during short duration, high intensity performance and some of the associated lactic acid fatigue factors seem to be offset as impairments in performance, although, subsequent performance might be affected, a factor to be assessed in the future.