Baking Soda Ingestion and the Effects on Endurance Cycling

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Research Question: Does ingestion of sodium bicarbonate improve an individual's sustained effort when completing a 20-minute aerobic functional threshold power (FTP) cycling test?

Introduction

- Have you ever experienced a burning sensation in your muscles when you are exercising?
- This sensation, as well as muscle fatigue, comes from increased hydrogen ions (H+) in the muscle cell, which inhibits the rate of muscle contraction and decreases performance.
- Sodium bicarbonate (SB) acts as a natural buffering agent to reduce H+ which delays fatigue and improves aerobic performance.

Purpose & Hypothesis

Purpose: Determine whether SB has a positive correlation on sustained aerobic performance.

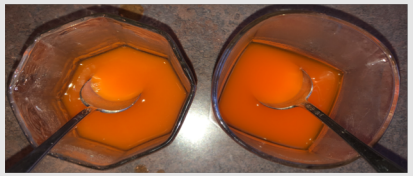
Hypothesis: Ingesting sodium bicarbonate 1-hour prior to the FTP cycling test will decrease sustained power output and increase distance covered.

Methods

Participants

- 11 participants: male and female, average age = 23.4 yrs, average weight = 75.47 kg, fitness level = minimum of 4 days of activity per week

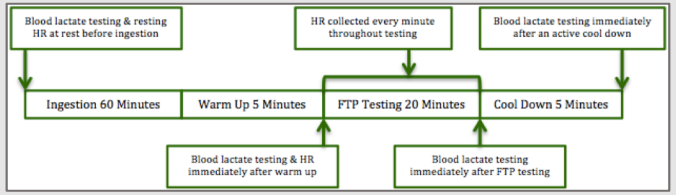
Table Salt **Baking Soda**



Experimental Design

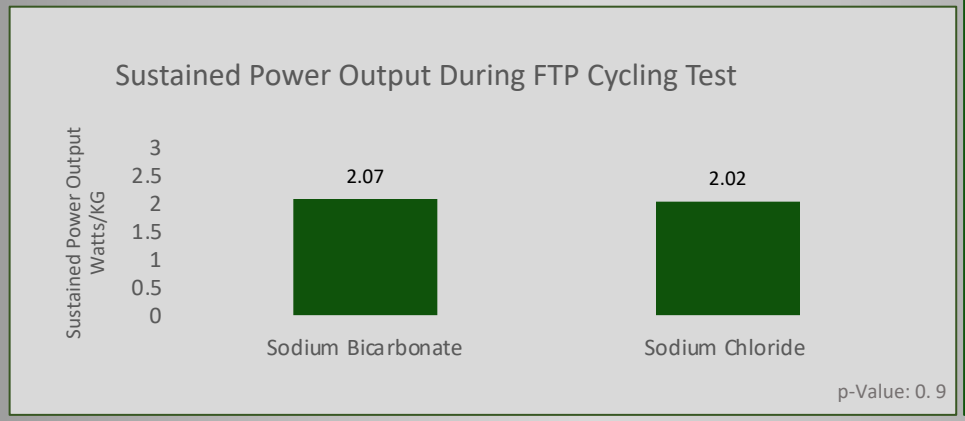
	Test Day 1	Test Day 2
Participant 1	SB	Placebo
Participant 2	Placebo	SB
Participant 3	Placebo	SB
Participant 4	Placebo	SB
Participant 5	SB	Placebo
Participant 6	Placebo	SB
Participant 7	SB	Placebo
Participant 8	Placebo	SB
Participant 9	SB	Placebo
Participant 10	Placebo	SB
Participant 11	SB	Placebo

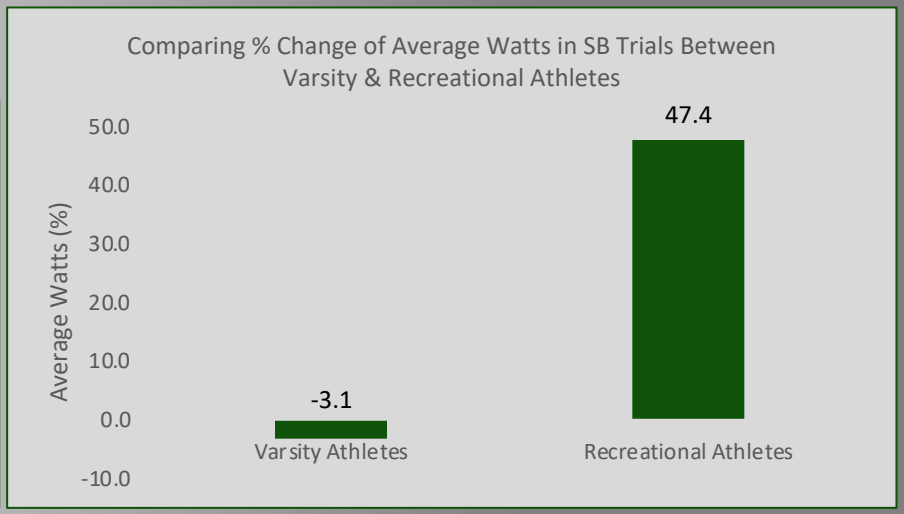
Test Day Overview:



Results

No statistical significant difference in variables including blood lactate, heart rate and distance covered when comparing dependent and independent variables.





Discussion

- 20% decrease of average watts exerted to achieve a similar distance covered.
- No statistical significant differences between SB ingestion and sustained aerobic performance.
- 6 out of 10 participants improved distance covered with a decrease in average watts exerted; other 4 outcomes remain undetermined.
- During SB trials, untrained participants displayed a greater increase (47.4%) in average watts compared to trained participants possibly due to inefficient hydrogen buffering.
- Lactate levels were higher when ingesting SB (0.22 mmols) than sodium chloride, which confirm research conducted by Egger et al., 2014.
- Heart rate indicated performer intensity; there was a 3% decrease in heart rate after ingesting SB.

Take Home Message

There is no statistical significant difference between SB ingestion and sustained power output, however, recreational athletes looking to improve aerobic performance may utilize SB to improve power output and delay fatigue.

Future Research

Future research may show a statistical significant difference with a larger sample size and trained participants as this study achieved positive results when comparing trained versus untrained athletes.

References

Egger, F., Meyer, T., Such, U., & Hecksteden, A. (2014). Effects of Sodium Bicarbonate on High-Intensity Endurance Performance in Cyclists: A Double-Blind, Randomized Cross-Over Trial. PLoS ONE, 9(12), 1–15. https://doi.org/10.1371/journal.pone.0114729

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