



# EFFECTS OF FASTING ON SUBMAXIMAL EXERCISE

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## Abstract

**INTRODUCTION:** Glucose is the primary energy source for the human body. It is obtained through eating carbohydrates among other things. Its chemical energy contributes to the generation of ATP during aerobic respiration. Glucose is stored in the body's muscles and liver as glycogen where it can then be readily converted back to its original form. Studies have now shown there to be benefits from fasting before exercise. When eating carbs before a workout it promotes energy storage, inhibits the sympathetic nervous system and therefore reduces fat burning. In the fasting condition process such as energy storage cease.

**PURPOSE:** The purpose of this study was to see if fasting allows the body to use glycogen stores more readily and will the use of those stores increase one's exercise performance.

**METHODS:** Three men (M; age 22 + 4.5 yrs) and three women (W; age 27.7 + 8.7 yrs) of the UTA student body, volunteered to participate in this study. Each subject had their height and weight recorded. All subjects performed a steady state 30 minute submaximal cycle test on two separate occasions. There were two conditions; Non-fasted (NF) in which subjects were able to have a carb loaded breakfast and fasted (F) in which subjects refrained from any meals 12 hrs prior to testing. During each test heart rate (HR) and rate of perceived exertions (RPE) were recorded while volume of oxygen consumption (VO<sub>2</sub>) was measured by the sensormedics cart. Blood glucose (BGlu) levels were recorded pre and post-test.

**RESULTS:** All subjects reached 85% of their HR<sub>max</sub> (NF: 164.25 + 12.78 bpm; F: 164.15 + 20.28 bpm) there was no significant difference between the conditions (p > 0.05). The remaining values had similar outcomes. RPE (NF: 14.75 + 2.27; F: 15.3 + .84); VO<sub>2</sub> (NF: 1.31 + .86 L/min; F: 1.54 + 2.32 L/min) both having values with no significant difference (p > 0.05). BGlu levels resulted as expected, there was an increase average of about 13 mg/dL during fasted state. For non-fasted there was a decrease average of about 17.6 mg/dL. However, there was not a significant difference between the conditions (p > 0.05).

**CONCLUSION:** The results of this study indicate that there is not a dramatic difference in Blood Glucose levels between fasting and non-fasting conditions. Lack of difference could be associated with the inability to fully control subjects' diet.

## Purpose

The purpose of this study was to see if fasting allows the body to use glycogen stores more readily and will the use of those stores increase one's exercise performance.

## Methods

- There was a total of 6 participants; 3 males, 3 females ranging from ages of 19-41 yrs who varied in fitness background.
- The instruments used were: Sensormedics Cart, Monark Cycle Ergometer, Polar Heart Rate Monitor, Blood Glucose Monitoring System
- Subject Preparation:
  - The Subject would have either fasted overnight (12 hrs prior to testing) or have had a carb loaded meal
  - Height, Weight, Date of birth and resting Heart Rate (HR) was recorded
  - VO<sub>2</sub> Mouth Piece, Head Gear and Cycle height were adjusted to fit subject.

## Methods (cont'd)

- Blood Glucose (mg/dL) levels were taken pre and post-test.
- Sub-Max Cycle Test
  - 5 min Warmup with a workload of 150 kgm for males and 0 kgm for females
  - 30 min Exercise with a workload of 300 kgm for males and 150 kgm for females
  - Subjects were instructed to keep an approximate 60 rpm or keep HR at 85% of their HR<sub>max</sub>
- Test Day 2: Participant undergoes the same process



## Results

- Results of only 5 subjects were used due to one participant's inability to perform the test again.
- All participants reached 85% HR<sub>max</sub>
  - Mean HR: NF: 164.25 ± 12.78 bpm; F: 164.15 ± 20.28 bpm
  - Fasting Effect on HR: (p > 0.05)
- RPE averaged higher during Fasted state
  - Mean RPE: NF: 14.75 ± 2.27; F: 15.3 ± .84
  - Fasting Effect on RPE: (p > 0.05)

## Results (cont'd)

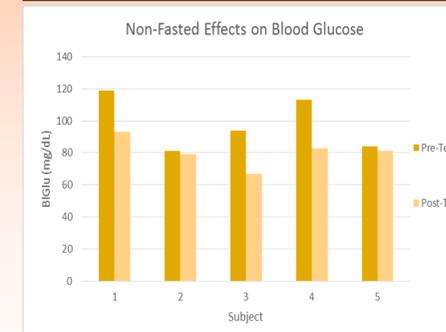


Figure 1: Graph depicts the participants blood glucose levels pre and post-test during the non-fasted state.

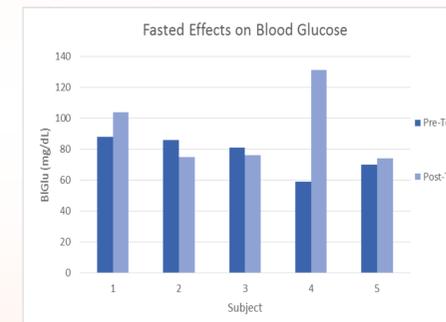


Figure 2: Graph depicts the participants blood glucose levels pre and post-test during the fasted state.

## Conclusions

The results of this study indicate that there is not a dramatic difference in Blood Glucose levels between fasting and non-fasting conditions. Lack of difference could be associated with the inability to fully control subjects' diet. In similar studies the amount of carbohydrates ingested by the participants was controlled by the administrator. Also fasting time was greater (Knapik et al, 1988). However, it can be seen through Figure 1 and 2 that Blood Glucose levels do differ between the two states to a degree. In the NF state glucose is being stored, whereas in the F state it is being retrieved.

- VO<sub>2</sub> averaged higher during Fasted state
  - Mean VO<sub>2</sub>: NF: 1.31 ± .86 L/min; F: 1.54 ± 2.32 L/min
  - Fasting Effects on VO<sub>2</sub>: (p > 0.05)
- Blood Glucose levels were as expected during both states
  - NF: Decrease average of 17.6 mg/dL
  - F: Increase average of 13 mg/dL
  - Fasting Effects on BGlu: (p > 0.05)