



EXERCISE EFFECTS ON BLOOD GLUCOSE RESPONSE TO CARBOHYDRATE DRINKS BETWEEN ETHNICITIES

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Abstract

TO DETERMINE THE EXERCISE EFFECT ON BLOOD GLUCOSE RESPONSE TO CARBOHYDRATE DRINKS TO EXERCISE BETWEEN DIFFERENT ETHNICITIES
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INTRODUCTION: Maximal oxygen consumption (VO₂max) is the maximum capacity of the body to transport and utilize oxygen during incremental exercise. It is expressed either as an absolute rate in liters of oxygen per minute (L/min) or as a relative rate in milliliters of oxygen per kilogram of body weight per minute (ml/kg/min). The blood glucose level is defined as the concentration of glucose in the blood, measured in milligrams of glucose per 100 milliliters of blood. Carbohydrate drinks are consumed before exercise because it is believed that it enhances performance by decreasing the rate of muscle glycogen stores, but those drinks also have a high amount of sugar in them which causes the blood glucose levels to spike. Exercise helps by increasing cellular uptake and lowering blood glucose because glucose is a rapidly metabolized form of energy.

PURPOSE: The purpose of this study was to determine the exercise effect on blood glucose response to carbohydrate drinks to exercise between different ethnicities.

METHODS: Five non-athlete Asian women (A; age 23.8±1.64 yrs, height 62±1 inches, weight 125.1±37.79 lbs) and five non-athlete Caucasian women (C; age 21.6±1.67 yrs, height 62.6±4.22 inches, weight 141.7±11.79 lbs) of the University of Texas at Arlington volunteered to participate in this study. Each subject had their body fat percentage assessed by a Bioelectric Impedance Analysis device. The baseline blood glucose was taken from each subject and recorded. Then each subject consumed Gatorade (5ml/kg of their body weight) and waited for 20 minutes after which their blood glucose was measured and recorded again. Next, each subject performed a graded exercise test on the treadmill with increasing speed and elevation until exhaustion. During each test heart rate (HR) and rate of perceived exertion (RPE) were recorded along with the maximal values measured by the metabolic cart, relative maximal oxygen consumption (VO₂max) and minute ventilation (VE). At the end of the five minute recovery, blood glucose was recorded again.

RESULTS: The percentage body fat calculated from the Bioelectrical Impedance Analysis device was 25.88±10.24 % (A) and 24.92±3.27 % (C) were not significantly different between the two ethnicities (p=0.85). The maximal values: HR (A: 183.6±8.68 bpm; C: 187.6±2.19 bpm) were also not significantly different between the two ethnicities (p=0.37). However there was a statistically significant difference (p=0.03) in the RPE (A: 16±1; C: 17.4±0.5) between the two ethnicities. There was also a statistically significant difference (p=0.012) in the relative VO₂ max (A: 24.66±4.59 ml/kg/min; C: 33.32±3.82 ml/kg/min). While not significant (p = 0.098), there was a trend for the Asian subjects (51.6 ± 30.0 mg/dL) to increase blood glucose more than Caucasian subjects (19.2 ± 8.4 mg/dL) following the Gatorade consumption before exercise and following exercise the Asian subjects decreased blood glucose more rapidly than Caucasians.

CONCLUSION: The results of this study indicated that Caucasians have a higher VO₂max than Asians. These VO₂max differences can be attributed to differences in exercise training. Also the Asian's blood glucose levels increased to a higher point and decreased more rapidly when compared to Caucasians.

Purpose

The purpose of this study was to determine the exercise effects on blood glucose response to carbohydrate drinks between two ethnicities: Asian and Caucasian

Methods

- Five non-athlete Asian Women and five non-athlete Caucasian Women from the University of Texas at Arlington volunteered for this study.

Race	Age	Weight	Height	%Body Fat
Asian	23.8±1.64 years	125.1±37.79 lbs	62±1 inches	25.88±10.24 %
Caucasian	21.6±1.67 years	141.7±11.79 lbs	62.6±4.22	24.92±3.27 %

- Each subject had their body fat percentage assessed by a Bioelectric Impedance Analysis device.
- The baseline blood glucose was taken from each subject and recorded.

Methods (cont'd)

- Next, each subject consumed Gatorade (5ml/kg of their body weight) and waited for 20 minutes after which their blood glucose was measured and recorded again.
- Then the subjects performed the VO₂ max test based on the Bruce Protocol.

Instrumentation:

- Oxygen consumption was measured on the SensorMedics metabolic cart.
- A polar heart rate monitor was attached to each subject's chest.
- Every participant was fitted with headgear to hold a mouthpiece in place. A nose clip was used to ensure all expired air was analyzed.

Exercise Protocol:

- Completion of the VO₂ max test when exhaustion was reached.
- Measurement of Heart Rate and RPE every third minute.
- The final measurement of blood glucose taken at the end of five minutes of recovery.



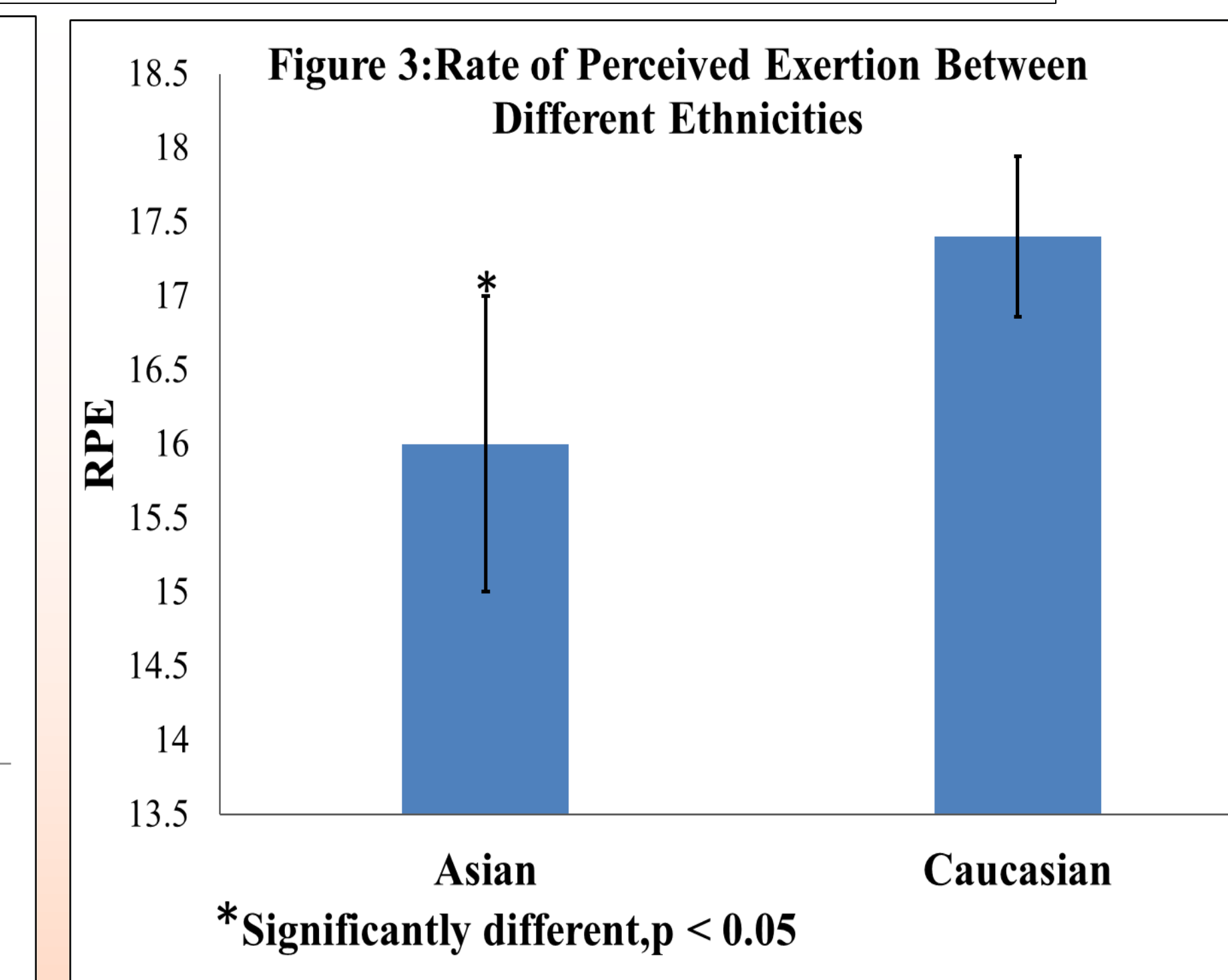
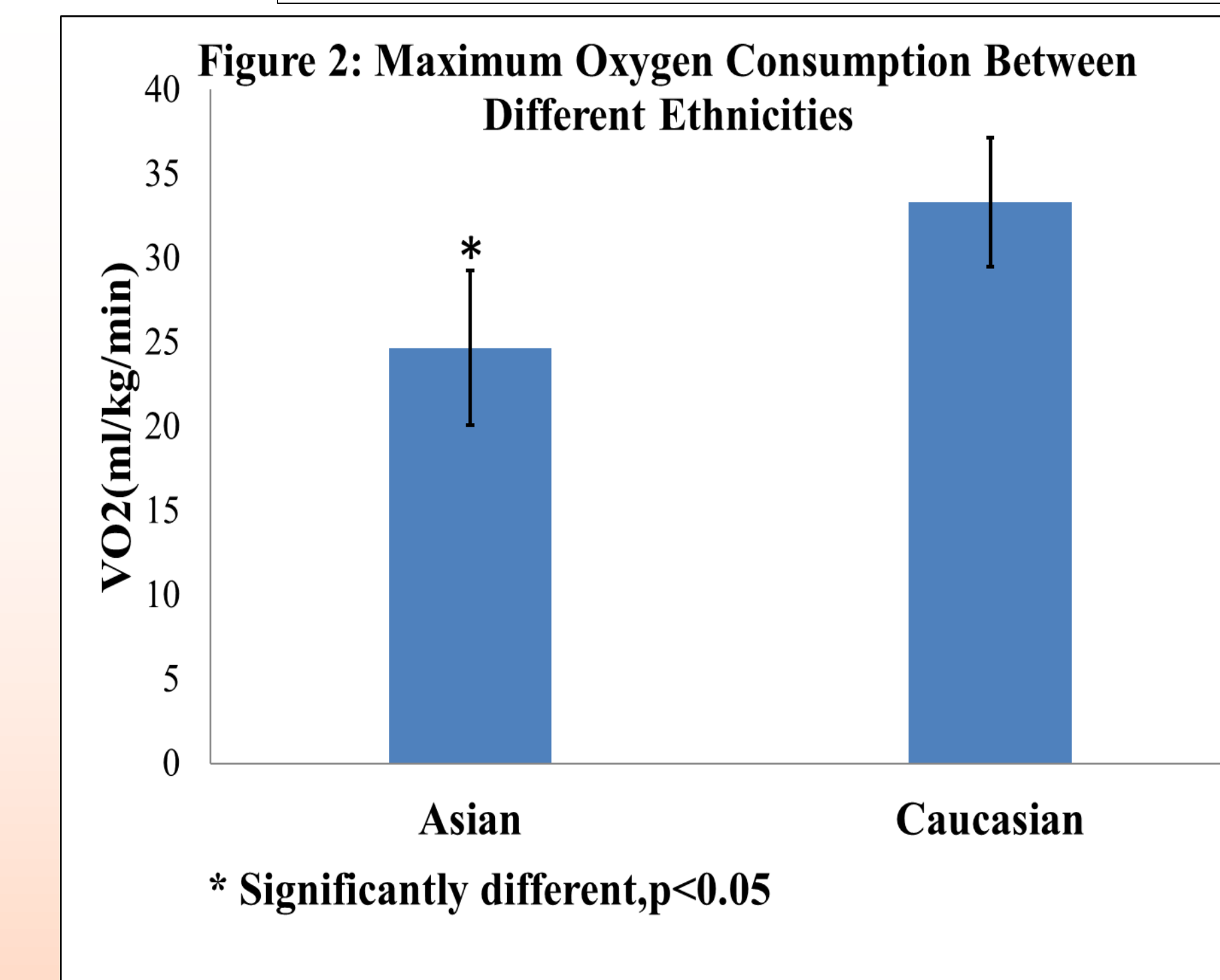
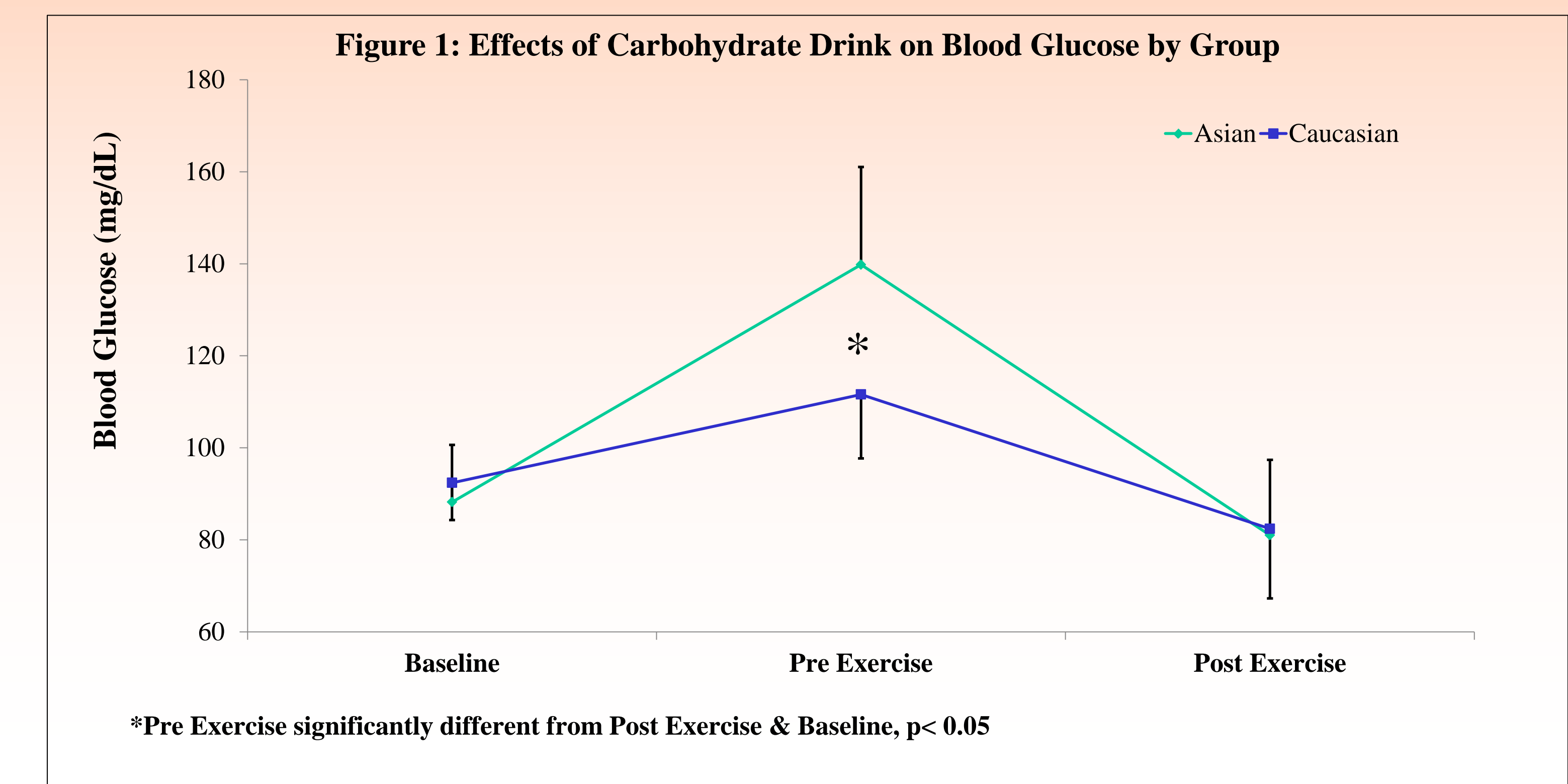
Results

Table 2: Mean Results for VO₂ and RPE with p values

Race	VO ₂ (ml/kg/min)	RPE
Asian	24.66±4.59	16±1
Caucasian	33.32±3.82	17.4±0.5
P values	0.012	0.03

*Significantly different, p ≤ 0.05

Results (cont'd)



Conclusions

- Based on the results of this study there was a trend for the Asian subjects to increase blood glucose more rapidly than the Caucasian subjects following the consumption of carbohydrate drink (Gatorade) and following exercise the Asian subjects decreased blood glucose more rapidly than Caucasian subjects.
- Also Caucasian subjects had higher VO₂ max and higher RPE which may be due to differences in exercise training.
- Suggestion for future studies: Larger sample size, chronic supplementation and insertion of control group.