

# Physiological Change Through Aerobic Exercise Under Hypoxic Conditions With An Elevation Mask

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## Abstract

**INTRODUCTION:** Athletes have found a new way to train to get an edge over their competitors and that is to train in an environment where oxygen is lacking. With a lower supply of oxygen, the body produces the hormone erythropoietin, which stimulates the bone marrow to create more red blood cells to form more hemoglobin. Hemoglobin are proteins inside red blood cells that carries oxygen to the tissues while bring carbon dioxide back to the lungs. When the athlete come back to normal elevation level, he or she usually holds an advantage over their competition due to their temporary elevated hemoglobin content. This usually leads to an increased performance in their respective field of athletic expertise.

**PURPOSE:** To compare the results of trained individuals' decreased heart rate as an aerobic threshold after training with elevation mask to individuals who trained without the elevation mask.

**METHODS:** Six subjects aged range from 18-35 were randomly split evenly into two groups, placebo and experimental, for the study. Their height, weight, resting heart rate, and timed mile run on the elliptical machine were measured before the test had begun. Subjects were told to finish a timed mile run on the elliptical machine for a total of 10 sessions in the 3 weeks of study. The post-test mile run would be after the nine sessions and consist of no masks and was used to measure any improvement in performance. During training, the placebo group wore a placebo elevation training mask and the experimental group wore the actual elevation training mask with the setting of 3000 feet above sea level. The heart rate of the subjects were measured before each session and also after each session. The mile time were recorded after each session.

**RESULTS:** The pre-test mean HR for the control group was at  $72.67 \pm 2.3$  bpm. For the experimental group, the pre-test mean HR was at  $68.33 \pm 16.56$  bpm. Meanwhile, the post-test HR for the control group was at  $71.33 \pm 1.155$  bpm. For the experimental group, the post-test HR was  $69.00 \pm 14.933$  bpm. The statistical values that was done for the pre-test and post-test comparisons was an  $F = .045$ ,  $p = 0.842$ . This means that there was no significance between the two. Statistically, comparing the two groups, the comparison was considered to be insignificant statistically standing at  $F = .136$ ,  $p = 0.731$ . In the pre-test mile time in the control group, the average time that was recorded was at  $11:11 \pm 03:02$  minutes. In the experimental group, the recorded average time was at  $10:37 \pm 00:53$  minutes. In the post-test mile time in the control group, the average time  $10:27 \pm 02:03$  minutes. For the experimental group's post-test mile time, it was recorded at  $09:39 \pm 00:47$  minutes. For the statistics value between the two groups, the  $F = .215$ ,  $p = 0.667$ . This means that the value was considered to be statistically insignificant. The statistical value that was done for the pre-test and post-test comparisons was insignificant at a value of  $F = 2.588$ ,  $p = 0.183$ .

**CONCLUSION:** The training mask did increase aerobic performance, as seen with the decrease in average mile time, but it did not affect the subjects' average resting heart rate at all.

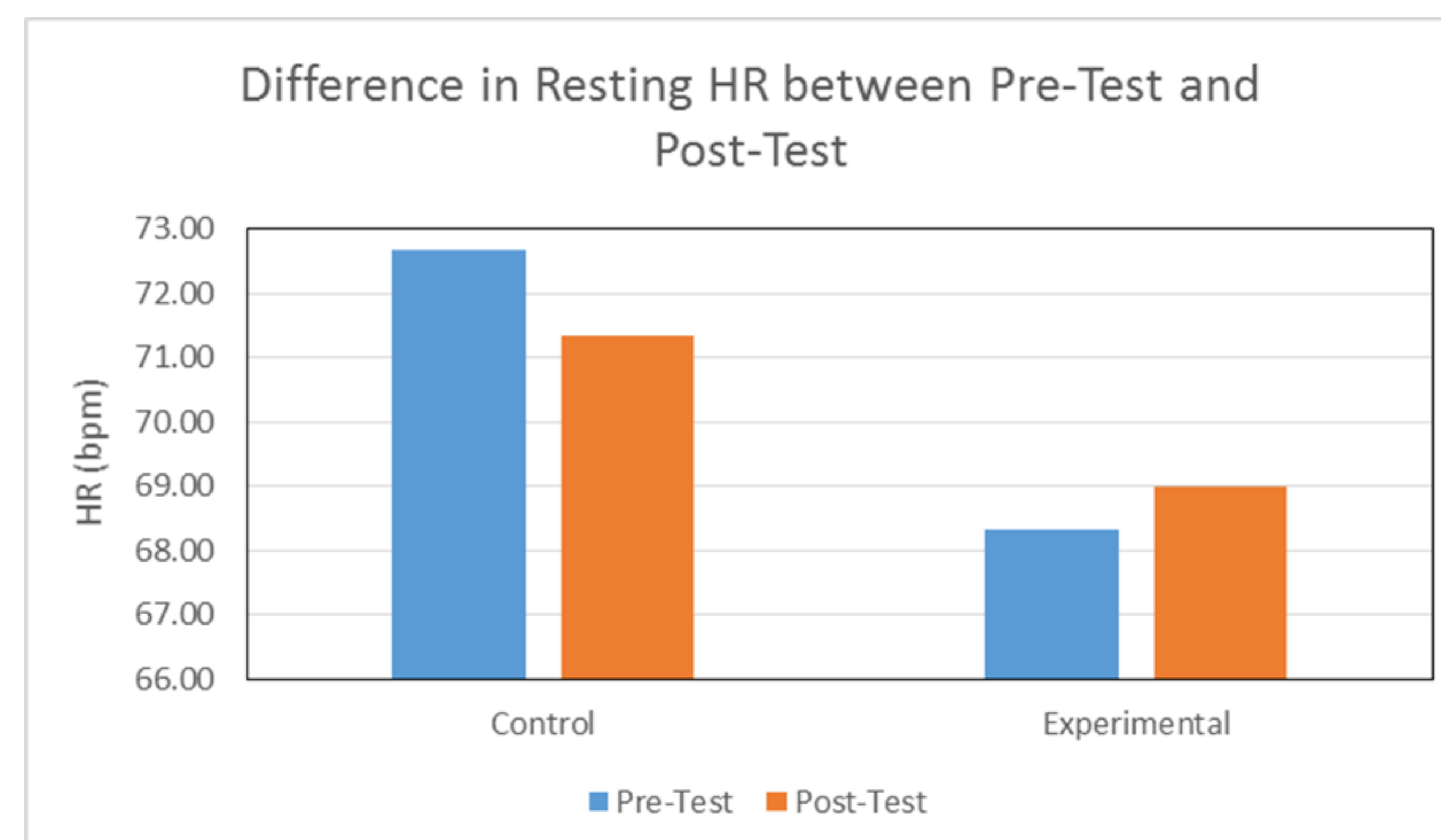
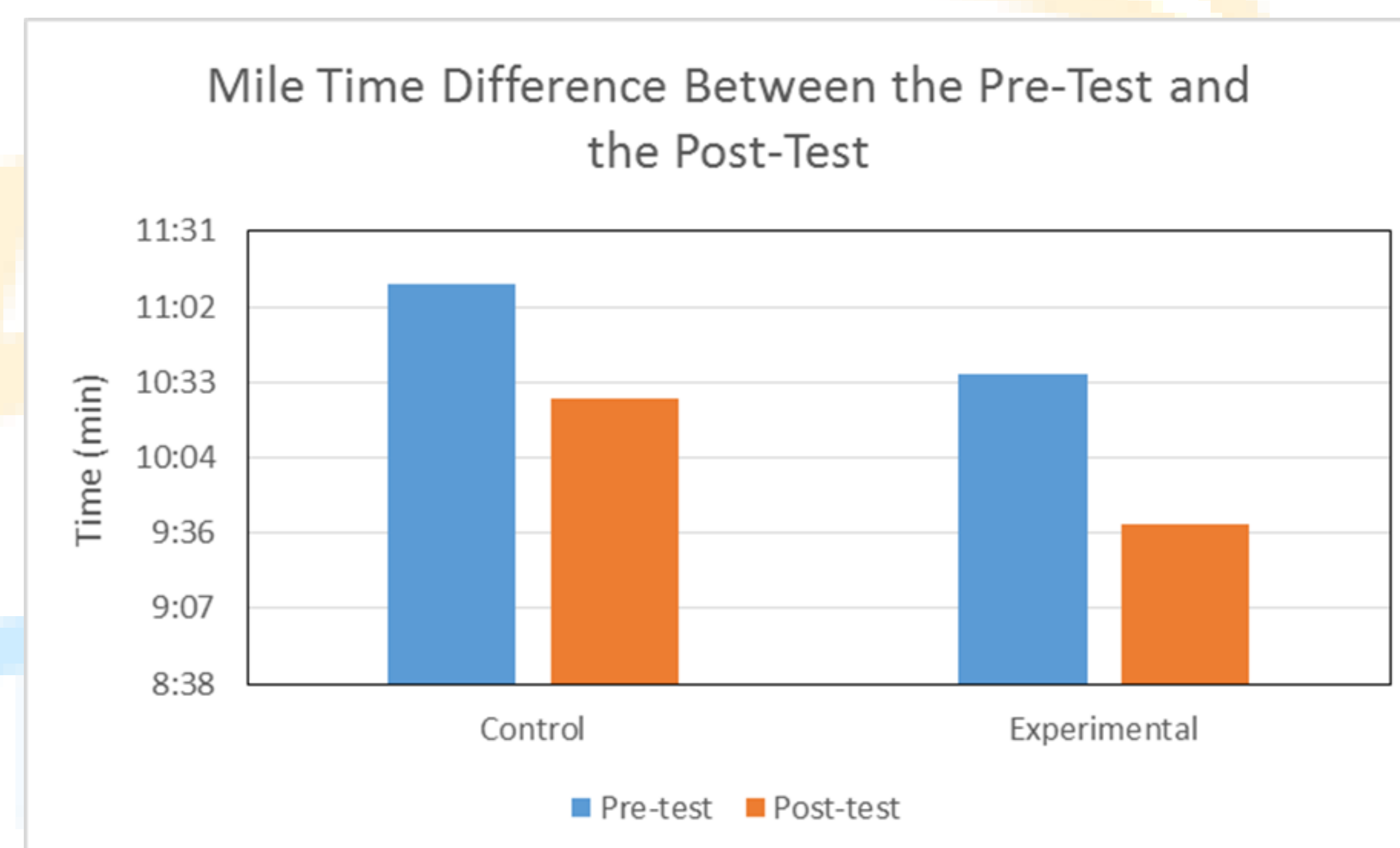
## BACKGROUND & PURPOSE

- In previous studies, athlete's have found that training at higher altitudes can give them a competitive edge in their respective sport. However, not every athlete has the luxury of training at higher altitudes, so an alternative method is to use an Elevation Training Mask 2.0 into their normal training regimen.
- Under hypoxic conditions or lower oxygen supply, the body generates erythropoietin which stimulates the production of red blood cells to carry additional oxygen to muscle tissues when training.
- When the athlete returns to training to their normal elevation, the added hemoglobin will physiologically result in an increased  $VO_2$  max.
- The purpose of the this study was to compare the results of trained individuals' decreased heart rate as an aerobic threshold after training with elevation mask to individuals who trained without the elevation mask.

## METHODS

- Six participants, ages 18-35 years old, volunteered for the study. All participants were considered healthy who could finish a 1-mile aerobic run on an elliptical.
- An Elevation Training Mask 2.0 was used for the study. It's purpose is to simulate high altitude train from the ranges of 3000 feet to 18,000 feet above sea level.
- Height, weight, and resting heart rate were measured prior to initiation of training. A pretest was than conducted as a baseline measurement for the study. The six participants were than randomly assigned evenly into a control or experimental group.
- The control group wore the mask without any air flow restriction and the experimental group wore the same mask, but the settings were placed to simulate an altitude of 3000 feet above sea level.
- A total of ten sessions were conducted for both group over a 3 week period followed by a post test without the mask.
- Resting heart rate and mile time were measured during each session.
- Results from pre test and post test were compared for both experimental and control group.

## RESULTS



## DISCUSSION & CONCLUSION

- A dependent *t-test* analysis using repeated measures indicated that there was no significant change in comparison to both group's mile time as well as resting heart rate
- Pretest and post-test comparisons were also insignificant
- Average resting heart rate in the control group decreased slightly and the experimental group's resting heart rate increased slightly.
- Mile time for both groups also decreased slightly, with the experimental group's mile time having a higher decrease
- Overall, the training mask did not serve its purpose in increasing aerobic performance as stated in advertisements
- No significant changes were exhibited amongst both the groups when comparing the effects of the elevation mask

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