

The Hormonal Response To Exercise Of Varying Intensities In Normoxic And Hypoxic Environments

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It is thought that by simulating a high altitude environment, there will be greater improvements in the individuals' aerobic capacity. Therefore athletes have started to utilize commercially available hypoxic chambers, training purposes. However, due to the physiologic stress involved in periods of exhaustive, vigorous exercise, especially in a hypoxic environment, the body's ability to maintain hormonal equilibrium may be altered.

PURPOSE

The purpose of this study was to investigate the effects of hypoxia on the hormonal responses during prolonged, moderate and high intensity exercise.

METHODS

Nine (n = 9) male subjects participated in the study. Participants underwent two maximal aerobic capacity tests (VO₂ max) prior commencing the experimental trials, one VO₂ max test under normoxic conditions, the other VO₂ max under mildly hypoxic conditions (Inspired oxygen concentration = 14.65%). Participants exercised for 60 minutes under four randomly assigned experimental conditions that were separated by at least seven days: 1) 40% normoxic VO₂ max in a normoxic environment, 2) 40% hypoxic VO₂ max in a hypoxic environment, 3) 60% normoxic VO₂ max in a normoxic environment, and 4) 60% hypoxic VO₂ max in a hypoxic environment. Rectal temperature (T_{re}) and mean skin temperature (T_{sk}) were measured at baseline (BASE), 5 minutes (min), 10 min, 20 min, 30 min, 40 min, 50 min, and 60 min of exercise.

RESULTS

There was no significant difference between NORM and HYP conditions for plasma norepinephrine (2.78±1.43 and 2.36±1.27 nmol·L⁻¹, respectively; p = 0.149). However, a significant difference was observed between the pooled low and high intensity conditions (2.21±1.03 and 2.92±1.54 nmol·L⁻¹, respectively; p = 0.011). There was no significant difference between NORM and HYP conditions for plasma epinephrine (401.45±257.73 and 363.58±186.49 pmol·L⁻¹, respectively; p = 0.164). There was also no difference between the low and high intensity conditions with respect to plasma epinephrine (335.89±137.19 and 429.13±280.51 pmol·L⁻¹, respectively; p = 0.200). There was no significant difference in plasma cortisol with respect to the NORM and HYP conditions (25.36±7.60 and 24.07±5.66 µg·dL⁻¹, respectively; p = 0.404). There was also no difference between low and high intensities with respect to plasma cortisol (23.12±5.25 and 26.29±7.60 µg·dL⁻¹, respectively; p = 0.121).

CONCLUSIONS

These data suggest that the selected hormonal response was similar between exercise performed in the hypoxic vs. the normoxic environment.