

Effects of Acute Supramaximal Intermittent Exercise at Moderate Altitude on Next-day Anaerobic Capacity

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1. Purpose

In previous studies, short-term training in hypoxia (the equivalent of 3000m altitude~) was used to enhance anaerobic performance. However, it is unclear that effects of acute high intensity exercise have at moderate altitude. The present study was conducted to reveal whether acute supramaximal intermittent exercise at altitude of 1500m might alter the next-day anaerobic capacity.

2. Methods

18 healthy men (age 21.5 ± 1.3 years, height 174.3 ± 6.5 cm, weight 70.6 ± 6.6 kg, $\dot{V}O_{2\max}$ 51.6 ± 4.7 ml/kg · min) performed supramaximal intermittent exercise (EXP1: $120\% \dot{V}O_{2\max}$, 120rpm, 90sec + 60sec + 60sec, n=10) and moderate sustain exercise (EXP2: OBLA, 90rpm, 373.1 ± 43.6 sec, n=8) on a cycle ergometer at altitude of 1500m. The performance test (PT: $120\% \dot{V}O_{2\max}$, 120rpm, 90sec) was performed to determine the anaerobic capacity under sea level on the day after the exercise in either condition. In addition, a maximum cycling exercise test and PT (Baseline) were carried out in advance. Measurements were arterial oxygen saturation (SpO_2), ventilation, oxygen uptake, respiratory exchange ratio (RER), heart rate variability, blood lactate concentrations (BLa), rating of perceived exertion (RPE), total work and power output.

3. Results

The parameter that BLa and SpO_2 significance

changed EXP1 compared with EXP2 on exercise under 1500m ($P < 0.01$ / $P < 0.05$). In addition, on the PT, total work significance increased EXP1 compared to Baseline ($P < 0.05$) (Fig.1). Further, power output in 80sec~90sec, RER and ventilation during exercise, Oxygen uptake during recovery and LF/HF at rest significance increased EXP1 compared with Baseline and EXP2 ($P < 0.01$ / $P < 0.05$). SpO_2 , HR, La and RPE did not change significantly. Also, there was significant correlations among the changes in SpO_2 from rest at SL to post exercise at 1500m and the change in total work from on PT ($r = 0.817$, $P < 0.05$).

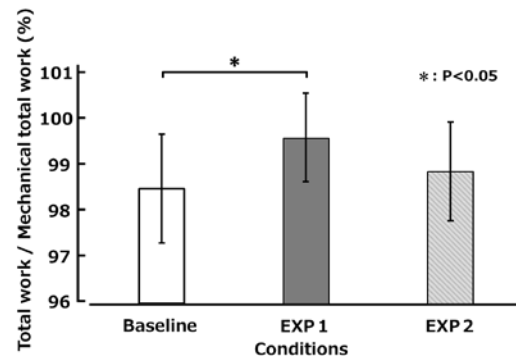


Fig.1. Comparison with of total work in PT for each condition.

4. Conclusions

These results suggested that acute supramaximal intermittent exercise at altitude of 1500m improved anaerobic capacity on following day. Changes in the physiology indicate that the exercise enhances lactate metabolic response. In addition, we found SpO_2 levels decrease during exercise at moderate altitude followed by anaerobic performance improvement next day at below sea level conditions.