

Acclimatization to altitude and normoxic training improve 400-m running performance at sea level

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Protocol:

- 10 days in normobaric hypoxia in an altitude house at the equivalent of 8,000 feet (oxygen content = 15.8%).
- Training performed at sea level.
- Control group lived & trained at sea-level.

Results

400m running time

- Live High, Train Low group...Significant drop
- Sea-Level group...No change

Max. velocity in ramp test

- Live High, Train Low group...Increased 2.2%
- Sea-Level group...No change

Velocity at lactate threshold (5Mm)

- Live High, Train Low group...Significant increase
- Sea-Level group...No change

Abstract

To investigate the benefits of 'living high and training low' on anaerobic performance at sea level, eight 400-m runners lived for 10 days in normobaric hypoxia in an altitude house (oxygen content = 15.8%) and trained outdoors in ambient normoxia at sea level. A maximal anaerobic running test and 400-m race were performed before and within 1 week of living in the altitude house to determine the maximum speed and the speeds at different submaximal blood lactate concentrations (3, 5, 7, 10 and 13 mmol x l(-1)) and 400-m race time. At the same time, ten 400-m runners lived and trained at sea level and were subjected to identical test procedures. Multivariate analysis of variance indicated that the altitude house group but not the sea-level group improved their 400-m race time during the experimental period ($P < 0.05$). The speeds at blood lactate concentrations of 5-13 mmol x l(-1) tended to increase in the altitude house group but the response was significant only at 5 and 7 mmol x l(-1) ($P < 0.05$). Furthermore, resting blood pH was increased in six of the eight altitude house athletes from 0.003 to 0.067 pH unit ($P < 0.05$). The results of this study demonstrate improved 400-m performance after 10 days of living in normobaric hypoxia and training at sea level. Furthermore, the present study provides evidence that changes in the acid-base balance and lactate metabolism might be responsible for the improvement in sprint performance.