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The effects of intermittent hypoxia training on aerobic capacity and blood components of endurance athletes

The aim of the present study was to evaluate the efficacy of intermittent hypoxic training (IHT) with 95 % of lactate threshold workload (WRLT) on aerobic capacity and endurance performance in well-trained cyclists. Twenty male elite cyclists, randomly divided into a hypoxia (H) group (n=10; age 22 ± 2.7 years; VO_{2max} 67.8 ± 2.5 ml·kg⁻¹·min⁻¹); body height (BH) 1.78 ± 0.05 m; body mass (BM) 66.7 ± 5.4 kg; fat free mass (FFM) 59.3 ± 5.1 kg; fat content (FAT%) 11.3 ± 2.1 %), and a control (C) group (n = 10; age 23.5 ± 3.5 years; VO_{2max} 67.7 ± 2.0 ml·kg⁻¹·min⁻¹); BH 1.79 ± 3.2 m; BM 69.2 ± 5.5 kg; FFM 63.6 ± 4.8 kg; FAT% 7.9 ± 1.94 %) took part in the research project. The training program used during the experiment was the same for the both groups. For three weeks, the subjects in H group performed 3 training sessions per week in normobaric hypoxia environment (IHT - O₂ = 15.2%). During the elemental core of the IHT session, the intensity was set at 95% WRLT for 30-min in 1(st) microcycle, 35-min in 2(nd) microcycle and 40-min in 3(rd) microcycle. The same training procedure was provided in C group, yet the intensity of the main sessions were set at 100% WRLT in the normoxia environment. The results indicate a significant ($p < 0.05$) increase in VO_{2max} , VO_{2LT} , WR_{max} , WRLT and change in lactate concentration (ΔLA) during incremental test in H group. Also a significant ($p < 0.05$) decrease in time of the time trial was seen, associated with a significant increase ($p < 0.05$) in average generated power (P_{avg}) and average speed (V_{avg}) during the time trial. The intermittent hypoxic training (IHT) applied in this research did not significantly affect the hematological variables considered: number of erythrocytes (RBC), hemoglobin concentration (HGB) and haematocrit value (HCT). Significant blood value increases ($p < 0.05$) were only observed in MCV in H group. This data suggests that intermittent hypoxic training at lactate threshold intensity and medium duration (30-40min) is an effective training means for improving aerobic capacity and endurance performance at sea level. Key points The efficacy of the intermittent hypoxic training is mostly dependent on volume and intensity of exercise in the hypoxic environment. The observed results suggests that intermittent hypoxic training at lactate threshold intensity and medium duration (30-40min) is an effective training means for improving aerobic capacity and endurance performance at sea level.

<http://www.actakin.com/PDFS/BR0502/SVEE/04%20CL%2008%20MP.pdf>