

28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Effect of High-Intensity Interval Training and Repeated Sprint Training in Hypoxia on Performance in Female Sprinters

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INTRODUCTION:

High-intensity interval training in hypoxia has been used widely by several type of athletes. Recently, the effect of repeated sprint training in hypoxia caused further increases in sprint performance with augmented anaerobic energy supply [1, 2]. However, the influence of combined high-intensity interval training and repeated sprint training in hypoxia on performance has not been fully evaluated in female sprinters. Therefore, the purpose of the present study was to determine the effect of combination of high-intensity interval training and repeated sprint training in hypoxia on performance among competitive female sprinters.

METHODS:

Eight sprinters (height; 161.6 ± 1.1 cm, body weight; 55.9 ± 1.6 kg) performed sprint training under hypoxic conditions [fraction of inspired oxygen (FiO₂): 14.5%, a simulated altitude of 3,000m] twice per week for the first half of two week once per week for the latter half of two week (total training sessions: 6). The training consisted of four types of test [10-s maximal sprint, repeated sprint (5 × 7-s sprints), 30-s submaximal sprint following 10-s maximal sprint, and high-intensity interval exercise (5-10 × 60-s submaximal sprints)]. Before and after the training period, repeated sprint ability (5 × 7-s sprints) and 60-s sprint ability tests were conducted. Respiratory samples were collected to evaluate oxygen uptake (VO₂), carbon dioxide production (VCO₂), ventilation volume (VE), and respiratory exchange ratio (RER) during 60-s sprint ability test. Blood lactate concentrations were determined before exercise, immediately after exercise, and 3, 5 and 7 min after exercise. Moreover, time-course changes in peak and mean power output were evaluated.

RESULTS:

In the repeated sprint ability test, mean power output significantly increased compared with before training ($P < 0.01$, ES = 0.74). There was a significant main effect of time ($P < 0.01$, ES = 0.90) for blood lactate concentration, but no significant difference after the training period was observed ($P = 0.07$, ES = 0.45). Mean power output during 60-s sprint ability test was significantly increased compared with before training ($P = 0.04$, ES = 0.52). Post-exercise blood lactate concentrations did not differ significantly after the training period ($P = 0.43$, ES = 0.16).

CONCLUSION:

Combined high-intensity interval training and repeated sprint training in hypoxia caused further increase anaerobic performance without affecting post-exercise blood lactate concentration.

1. Kasai et al. (2017) 2. Girard et al. (2020)

Topic: Training and Testing

Presentation: Poster

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