The Effect of Dynamic Intermittent Hypoxic Conditioning on Arterial Oxygen Saturation

Ronald K. Hetzler, PhD, Christopher D. Stickley, PhD, Iris F. Kimura, PhD, Michelle LaBotz, MD, Andrew W. Nichols, MD, Kenneth T. Nakasone, MS, Ryan W. Sargent, MS, Lawrence P.A. Burgess, MD

ABSTRACT

Background

Increases in arterial oxygen saturation (SaO₂) in response to intermittent hypoxic exposure (IHE) are well established. However, IHE protocols have historically involved static hypoxic environments. The effect of a dynamic hypoxic environment on SaO₂ is not known.

Objective

The purpose of this study was to examine the effect of dynamic IHE conditioning on SaO₂ using the Cyclical Variable Altitude Conditioning Unit.

Methods

Thirteen trained participants (9 males, age 30.1 ± 9.2 years; 4 females, age 30.3 ± 8.9 years) residing at or near sea level were exposed to a 7-week IHE conditioning protocol (mean total exposure time = 30.8 hours). Participants were exposed to a constantly varying series of hypobaria pressures simulating altitudes from sea level to 6858 m (22 500 feet) in progressive conditioning tiers, creating a dynamic hypoxic environment. SaO₂ was evaluated using pulse oximetry (SpO₂) 4 times: at 2740, 3360, and 4570 m, prior to and following the first 3 weeks of IHE, and at 4570, 5490, and 6400 m at the start and end of the final 4 weeks.

Results

SpO₂ improved 3.5%, 3.8%, and 4.1% at 2470, 3360, and 4570 m, respectively (P < .05), and 3.3%, 3.4%, and 5.9% at 4570, 5490, and 6400 m, respectively (P < .05). At 4570 m, SpO₂ increased from 81.7% ± 6.5% to 89.1% ± 3.2% over the entire 7-week conditioning period.

Discussion

The dynamic intermittent hypoxic conditioning protocol used in the present study resulted in an acclimation response, such that SpO₂ was significantly increased at all altitudes tested, with shorter exposure times than generally reported.

Read the full study at: http://www.wemjournal.org/article/S1080-6032(09)70080-8/abstract