The Physiological Effects of Pseudoephedrine on Endurance Cycling

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Abstract

Background: Pseudoephedrine (PSE) is a mild central nervous system stimulant that when consumed at a high dosage has the potential to alter physiological and psychophysical responses. PSE is widely accessible as over-the-counter medication and despite limited research into PSE at high dosages or its effects on prolonged exercise (>2 hours) is no-longer on the World Anti-Doping Association's banned substance list. Currently unrestricted in sport and with no real understanding of the abovementioned responses during endurance exercise there is a high potential for abuse in sport. A recent study performed in our laboratory found PSE to improve self-paced cycling performance in some individuals, however no physiological measurements were taken

Purpose: The primary purpose of this study was to determine the physiological effects of PSE at a dosage previously shown to improve performance (2.5 mg/kg) in some individuals during prolonged cycling. A secondary purpose of this study was to assess the effect on endurance cycling performance.

Methods: In a randomized, double-blind and counter-balanced design, ten well-trained cyclists participated in two trials, consisting of 120 min of fixed-intensity cycling at 65% $\dot{V}O_{2max}$ followed by a set work, self-paced time-trial (TT) of ~30 min, following ingestion of either 2.5 mg/kg PSE or visual-matched glucose placebo. Venous blood samples were collected before and during exercise, along with body temperatures and heart rate. Perceived effort and expired gas samples were collected during exercise. Exercise and diet was controlled ~48-hours prior to the trials.

Results: Mean heart rate was significantly higher with PSE (P = 0.028) during fixed-intensity exercise. Blood glucose concentrations were significantly lower with PSE (P <0.001) for the first 40 min of fixed-intensity exercise. Respiratory exchange ratio was lower in the final 20-min of fixed-intensity and TT with PSE.

Blood lactate, perceived effort, ventilation, and body temperatures were not significantly different between conditions during exercise, nor was TT performance; however individual response was variable.

Conclusions: PSE ingestion increased heart rate during endurance cycling and initially suppressed carbohydrate release into the bloodstream while increasing fat oxidation in the later stages of exercise. Despite individual responses, endurance cycling performance remained unchanged with PSE ingestion.

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The Central Regional Health and Disability Ethics Committee (CEN/08/04/016) approved testing procedures and written consent was obtained from all participants prior to commencing the study.

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