Effects of Short-Term Training Using Powercranks on Cardiovascular Fitness and Cycling Efficiency

Mark D. Luttrell, and Jeffrey A. Potteiger

\textit{Department of Health, Sport and Exercise Science, University of Kansas, Lawrence, Kansas 66045}

\textit{Department of Physical Education, Health and Sport Studies, Miami University, Oxford, Ohio 45056-3491}

\textit{Address correspondence to Dr. Jeffrey A. Potteiger, E-mail: potteija@muohio.edu}

\textbf{ABSTRACT}

Powercranks use a specially designed clutch to promote independent pedal work by each leg during cycling. We examined the effects of 6 wk of training on cyclists using Powercranks (n = 6) or normal cranks (n = 6) on maximal oxygen consumption (\(\dot{V}O_2\text{max}\)) and anaerobic threshold (AT) during a graded exercise test (GXT), and heart rate (HR), oxygen consumption (\(\dot{V}O_2\)), respiratory exchange ratio (RER), and gross efficiency (GE) during a 1-hour submaximal ride at a constant load. Subjects trained at 70\% of \(\dot{V}O_2\text{max}\) for 1 h·d\(^{-1}\), 3 d·wk\(^{-1}\), for 6 weeks. The GXT and 1-hour submaximal ride were performed using normal cranks pretraining and posttraining. The 1-hour submaximal ride was performed at an intensity equal to approximately 69\% of pretraining \(\dot{V}O_2\text{max}\) with \(\dot{V}O_2\), RER, GE, and HR determined at 15-minute intervals during the ride. No differences were observed between or within groups for \(\dot{V}O_2\text{max}\) or AT during the GXT. The Powercranks group had significantly higher GE values than the normal cranks group (23.6 ± 1.3\% versus 21.3 ± 1.7\%, and 23.9 ± 1.4\% versus 21.0 ± 1.9\% at 45 and 60 min, respectively), and significantly lower HR at 30, 45, and 60 minutes and \(\dot{V}O_2\) at 45 and 60 minutes during the 1-hour submaximal ride postraining. It appears that 6 weeks of training with Powercranks induced physiological adaptations that reduced energy expenditure during a 1-hour submaximal ride.


\textit{Keywords:} cycling efficiency, energy expenditure, cardiorespiratory, submaximal exercise.