Does training with PowerCranks™ affect economy of motion, cycling efficiency, oxygen uptake and muscle activation patterns in trained cyclists?

Masters Thesis

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(BSc. Sports Science)

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ACKNOWLEDGEMENTS

I would like to dedicate this thesis to the memory of David Deverell, my Pop, who still remains a strong driving force in my life and someone I miss very much.

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Abstract

PowerCranks™ are claimed to increase economy of motion and cycling efficiency by reducing the muscular recruitment patterns that contribute to the resistive forces occurring during the recovery phase of the pedal stroke. However, scientific research examining the efficacy of training with PowerCranks™ is lacking. Therefore, the purpose of this study was to determine if five weeks of training with PowerCranks™ improves economy of motion (EOM), gross efficiency (GE), oxygen uptake (Error! Bookmark not defined.\(\bar{V}O_2\)) and muscle activation patterns in trained cyclists. Sixteen trained cyclists were matched and paired into either a PowerCranks™ (PC) or Normal Cranks (NC) training group. Prior to training, all subjects completed a graded exercise test (GXT) using normal bicycle cranks. Additionally, on a separate day the PC group performed a modified GXT using PowerCranks™ and cycled only until the end of the 200W stage (PCT). During the GXT and PCT, \(FeO_2\), \(FeCO_2\) and \(\dot{V}E\) were measured to determine EOM, GE and \(\dot{V}O_2\)max. Integrated electromyography (iEMG) was also used to examine selected muscular activation patterns. Subjects then repeated the tests following the completion of training on their assigned cranks. No significant improvements were observed for EOM, GE, \(\dot{V}O_2\)max or iEMG in either the PC or NC group when subjects were cycling with normal cranks during the GXT. Likewise, no significant training effects were observed when PC subjects cycled with PowerCranks™ during the PCT. PC group subjects were significantly less efficient and economical, before and after training when cycling with PowerCranks™ compared to cycling with normal cranks. The results from this study do not support benefits claimed by PowerCranks™, however further research is needed to examine the influence of training with PowerCranks™ on various physiological variables over a more prolonged training duration.
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