

Journal of Science and Cycling

Breakthroughs in Cycling and Triathlon Sciences



Special number: World Congress of Cycling Science 2015, 1/2 July 2015, Utrecht

Editors: Mikel Zabala (PhD)
Greg Atkinson (PhD)



Science & Cycling
1 & 2 July 2015, Utrecht



OPEN ACCESS

www.jsc-journal.com

Pedaling Patterns of Professional Cyclists during a Grand Tour

G.W.M. Heijboer¹✉, A. Jamar, S. De Vries, M. Hesselink

Abstract

Introduction: Fatigue has been reported to alter Muscle activation patterns and pedaling technique in cyclists is affected by fatigue. One of the key biomechanical variables to assess pedaling technique is Index of Effectiveness (IE), defined as the ratio between effective force and total force on the crank. Although cycling is a bilateral movement, the relative contribution of the lower limbs to cycling power output is seldom symmetrical. Most studies on pedaling technique and bilateral asymmetry have been performed in laboratory settings and it is not known if, and to what extent, racing-induced fatigue affects these parameters during competition. Thus we analyzed if fatigue affected IE and Asymmetry Indices in professional cyclists during a 3-week stage race.

Methods: Left and right crank power and cadence were collected using a strain-gauge based pedaling monitor system (Pioneer SGY-PM910H) in 7 professional cyclists during the Giro d'Italia 2015. Two different sections of similar power output were selected for detailed analysis, one section at the beginning and one at the end of each stage. Average cadence, IE and Asymmetry Index (AI) for left and right crank power were calculated for these sections.

Results: Cadence dropped significantly from the beginning to the end of the stage during the race (87,8rpm - 80,3 rpm, $p=0,003$), while IE increased (46,9%-50,3%, $p=0,001$). AI decreased at the end of each stage (9,41%-7,89%, $p=0,007$).

Conclusions: Based upon data obtained during a professional stage race, this study is the first to show that – while power output was maintained – cadence and Bilateral Asymmetry dropped, whereas the Index of Effectiveness increased throughout the stages during a three-week stage race. This is in line with data previously obtained in a laboratory setting.

✉ **Contact email:** mathieu.heijboer@teamlottojumbo.nl (M. Heijboer)

¹ TEAM LottoNL-Jumbo.

