

The effect of time trial position on physiological variables in elite cycling.

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Purpose:

Knowledge about general and sport-specific characteristics is currently limited to adult professional cyclists from different disciplines. However, it is unknown to what extent these performance features are already present and reliably measurable in young and adolescent riders. Pion et al. (2014) have shown the relevance and discriminating character of the use of a general multidimensional test battery in young sporting populations, rather than sport-specific (due to trainability) and physiological tests (due to physiological adaptations during childhood and adolescence) [1]. Moreover, it was found that the profiles of athletes are very similar at young age and diverge after several years into talent development programs [2]. Early diversification is therefore suggested especially in late specialization sports such as cycling, but this does not alter the fact that the young athletes may already prepare themselves in the discipline that suits him/her the most. Consequently, the first aim of the present cross-sectional research is to obtain reference values for young and adolescent cycling athletes. The second purpose is to investigate if young talented athletes from the five selected disciplines, can be differentiated from each other based on a multidimensional test battery.

Methods:

Three male junior elite cyclists participated in the study. All participants were competitive at the national level and participated in the national championships. Three positions on the bike were used: a high and low time trial position and an upright position with straight arms holding on the base bars. Each bout lasted 5 minutes, was separated by 4 minutes of rest and the work rate was set relative to the individual level of each cyclist, at ~90% of their 20-min peak power. All cycling was done at freely chosen cadences on a time trial specific bike mounted on a trainer (Computrainer Lab™, Race Mate, Seattle, WA, USA).

Results:

MANCOVA revealed significant differences between the disciplines for the physical performance tests. BMX cyclists jumped further and were significantly faster on the sprint test than most of the other disciplines. The road cyclists were faster on the 30m sprint than the others with exception of BMX. In the older age group, the different cycling disciplines can be differentiated from each using a general multidimensional test battery. BMX cyclists had a significantly higher BMI and outperformed the others based on the SBJ, sprint test, the jumping sideways (motor coordination) and maximal cadence (cycling-specific) test. BMX and MTB riders also tended to score better on the balance beam test.

Discussion:

The present study is the first to document the athletic profile of young and adolescent cyclists from five different cycling disciplines. The profiles are similar at young age especially for the cycling disciplines where peak performance is achieved at later age. Within this population, it is suggested to stimulate early diversification and participation in multiple disciplines within cycling. BMX, in which athletes reach peak performance at early age, is the only discipline that can be differentiated from the others based on physical performance characteristics at young age. In the older age group, the athletic profiles become more distinguishable from each other, and differences are found for anthropometric, physical, motor coordination and cycling specific test(s). Although further research is warranted, these results suggest that the athletic profiles of the different cycling disciplines at young and adolescent age are considered to be complementary. This is a valuable finding in the discussion on early/late specialization and talent orientation.

References:

1. Moesch, K., et al., Late specialization: the key to success in centimeters, grams, or seconds (cgs) sports. *Scand J Med Sci Sports*, 2011. 21(6): p. e282-90.
2. Pion, J., et al., The value of non-sport-specific characteristics for talent orientation in young male judo, karate and taekwondo athletes. *Archives of Budo*, 2014.

