

Results of intensity variable effort on condition of Polish National Team cross country MTB cyclists

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Introduction

Selection of endurance test for cyclist, which reflects most precisely training or starting is very complicated. Accurate evaluation of endurance warrants precise indication of training load (Lucia et al 2004). Alteration of training load is precisely correlated with periodization of training load (Rønnestad, Hansen 2014) and is result of various training goals set for respective training periods (Rønnestad et al 2014). Purpose of this study was establishing training load during general and special preparatory periods in cross country cyclists. Double testing procedure for endurance testing was used to verify different intensity zone parameters.

Methods

Subjects for this study were cyclists MTB Cross Country team. Women (n=3), age: 28,5±2,3 years old, body mass: 54,1±2,2 kg, body height: 171,8±2,4 cm and men cyclists (n=5), age: 29,3±4,8 years old, body weight: 64,1±4,7 kg, body height: 178,6±3,4 cm, All studies were medalists of Olympic Games, World and Europe Championships Test were performed at the beginning of 12-week general and special preparatory period. The participants of the study performed graded incremental exercise test (GXTs). The GXTs test was executed on ergometer Cyclus 2 (RBM, Germany). The 1-st step was 1Wxkg-1 b.m. and increased every 3 minutes by 0,5 Wxkg-1 b.m. In last 30 seconds of every exercise grade was taken 20 µl of arterialized blood to the sign LA (Biosen S-line, EKF, Germany). In the course of effort VO₂, VE, VCO₂ was measured by means of K4b2 analyser. The heart rate monitor, Polar V650 (Polar Finland) measured HR during GXTs. At the level of aerobic threshold (LT) (Farell et al. 1979), anaerobic threshold (AT) (Powers et al. 1983) i VO₂max. the power value was set. After this subjects performed 60-minute effort characterized by: 10 minutes at 50% PVO₂max, 5 minutes at 75% PVO₂max, 5 minutes at 90% PVO₂max, 10 minutes at 50% PVO₂max, 10 minutes at 75% PVO₂max, 5 minutes at 90% PVO₂max, 6 minutes at 75% PVO₂max, 5 minutes 50% PVO₂max and 4 minutes at 100% PVO₂max.

Results

In table 1 presented are results of graded incremental endurance test. Table 2 presents results of 60-minute variable-intensity endurance test. This effort reflects loads of special training based on intensity and proportions which is used in cross country cycling. It allows to evaluate changes in endurance as results of applied training load. In both tested groups it was observed during graded test statistically significant increase ($p \leq .001 - 0.005$) of VO₂max induced during preparatory period. Other parameters i.e. HRmax and HR at aerobic and anaerobic threshold has not been changed significantly. Analysis of maximal values obtained during 60-minute test revealed reduced values of maximal LA, VE and HR after general preparatory period. With constant intensity in each preparatory period it was observed adaptation of energy system contribution to performer effort. Partially anaerobic effort was replaced by aerobic effort. Results of this study shown that first 6 weeks of preparatory period improved aerobic capacity and following 6-week period increased level of anaerobic values.

Conclusions

60-minute variable effort has served 2 planned in this study purposes. It has evaluated direction and range of changes in subsequent preparatory periods on following values: VO₂max, VEmax i HRmax. Intensity zones after general preparatory period are too low to evaluate effectiveness of training for general and special preparatory period. Training efforts lasting 60 minutes consisting of: 21 minutes at 50% PCr, 26 minutes at 75% PCr, 10 minutes at 90% PCr and 3 minutes at intensity of 100% PCr allows to observe effort which reflects specific cross country cycling effort. It also allows observe changes in endurance parameters during preparatory period. In order to use this test for purpose of



verification of training intensity zones, it is required to performing test and establishing parameters used in graded endurance test.

Table 1. GXTs parameters recorded during BASES test in Women and Men Polish National Team in MTB cross country before general (1), before special (2) after special (3) preparatory period

Parameters	Women						Men					
	1		2		3		1		2		3	
	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
VO ₂ max (mlx ⁻¹ l ⁻¹ xkg ⁻¹)	61,7	2,8	68,7	0,6	68,5	4,82	73,2	3,3	78,2	4,0	79,3	3,56
VE _{max} (lx ⁻¹ min ⁻¹)	106,3	21,5	104,3	17,2	112,7	18,34	162,3	16,0	183,0	37,8	171,2	29,28
HR _{max} (udx ⁻¹ min ⁻¹)	188,0	11,8	189,7	11,7	191,7	9,61	189,0	12,2	191,0	9,3	190	10,42
HR _{LT} (udx ⁻¹ min ⁻¹)	148,3	5,8	156,7	5,8	139,7	7,51	143,6	8,9	152,0	5,7	154,8	4,87
HR _{AT} (udx ⁻¹ min ⁻¹)	173,7	5,1	178,3	5,8	175,7	6,66	168,6	11,0	171,6	7,9	176,2	5,67
LA _{max} (mmolxl ⁻¹)	12,1	1,6	14,3	1,8	13,87	2,89	15,3	6,1	15,7	2,8	12,81	3,84

Table 2. Maximal values during 60-minute variable intensity test in Women and Men Polish National Team in MTB cross country before general (1), before special (2) after special (3) preparatory period

Parameters	Women						Men					
	1		2		3		1		2		3	
	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
VO ₂ max (mlx ⁻¹ l ⁻¹ xkg ⁻¹)	66,13	4,76	69,33	3,06	56,2	3,06	75,2	6,83	75,6	5,77	70,6	4,04
VE _{max} (lx ⁻¹ min ⁻¹)	105,3	25,5	88,3	5,77	68,7	5,7	146,8	141	134,2	23,2	121,8	10,4
HR _{max} (udx ⁻¹ min ⁻¹)	191	8,72	185	7,94	175	7,94	188,4	9,04	182,2	10,23	177	9,62
LA _{max} (mmolxl ⁻¹)	10,72	2,41	8,4	4,19	4,87	4,19	9,54	2,11	6,71	2,13	5,64	1,73

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