

ANALYSIS OF LITHUANIAN OLYMPIC ROWER'S TRAINING

by

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In 2000, at the Sydney Olympic Games, the Lithuanian women double scull crew won the bronze medal. The preparation cycle lasted four years, following the state program provided for sportsmen's preparation for the 'Sydney-2000' Olympic Games. The program provided for a wide range of organizational measures, means of training and sportsmen's adaptation monitoring.

The specific effect of rowing activities on the organism is rather varied. Sport results in this branch are mostly influenced by the indices of physical and functional capacity of the athlete. Therefore a complex analysis of the dynamics of these indices should form the basis of the control system of the athlete (Budget, 1989; Skład et al., 1996; Krupecki, 2000). It seems important to analyze the dynamics of physical development, physical capacity and functional ability in the course of a four-year preparatory cycle. This is of particular importance in the final stage of the pre-Olympic period. Knowing the peculiarities of adaptation in rowers, we can manage more efficiently the process of training, upgrade the plan of organizational measures and apply adequate recovery procedures (Foster et al., 1996; Kramer et al., 1994; Raslanas et al., 1998).

Alongside determining physical development, psychomotor functions, functional capacity of the anaerobic alactic and glycolytic as well as of the hemopoetic and respiratory systems are studied. Especially important information is provided by the indices of critical intensity limits, anaerobic

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metabolism threshold limits, as well as by the values of the degree of hypoxia, external and internal respiration, blood circulation functional indices at these limits (Chicharro et al., 1997; Milašius et al., 1998). Discerning the zones of intensity allows to determine the limits of the physiological and metabolic changes that appear while supplying energy to the working muscles (Mader, Heck, 1986; Rusko et al., 1978; Skinner, McLellan, 1980; Stainacker, 1993). However, the literature lacks data characterizing the course of organism's adaptation in highly skilled women rowers during the pre-Olympic preparatory cycle, in particular where the data on its final stage is concerned. Therefore, the aim of this work was to analyze the training and control aspects of the Lithuanian national Olympic double scull crew and the adaptation of their organism to physical loads during the last year of the four-year pre-Olympic period.

Methods

Two rowers of the Lithuanian women double scull crew who underwent a four-year pre-Olympic preparatory cycle were observed. Every pre-Olympic year they underwent 3-4 extensive examinations, measuring their physical development, single muscle contraction capacity (SMCC), and anaerobic alactic muscular capacity (AAMC). With the aid of the Concept II rowing ergometer we determined the momentum and average value of rowing capacity under the load lasting 10 s, 30 s, and while rowing for a distance of 500 m. The indices of anaerobic capacity were determined with an Ergooxyscreen gas analyzer by gradually increasing the load up to the critical intensity limit (CIL). Simultaneously, the anaerobic metabolism threshold (AMS) was determined. Within these limits we registered lung ventilation (LV), pulse rate (PR), oxygen uptake (VO₂ max) and power (W). To evaluate work efficiency, we determined oxygen uptake per 1W of working power.

Results

Analysis of the coordinating plan of preparation for Olympic Games-2000 showed that in the last pre-Olympic year the schedule of training and

competitions was complicated. During the last nine months the girls spent 188 days in the camps; their physical load covering 786 hours (Table 1). Such a model of coaching in the preparatory and competition periods had a positive influence on the process of organism's adaptation to physical loads.

Body mass of the rowers kept decreasing during the whole preparatory period before competitions because of fat mass decrement. The indices of single muscle contraction capacity and anaerobic alactic muscular capacity, although being of no considerable importance in rowing provide a rather interesting information concerning muscular power (Table 2). Their analysis shows that approaching the most important competitions of the season these indices kept gradually increasing and reached their top values by the time of the last examination. The specific tests, with the use of a rowing ergometer, determining the athletes form and functional working capacity were of particular importance. The anaerobic alactic muscular capacity under specific conditions (rowing with a maximum effort) was shown by the momentum and average values of a 10-second test. These indices were found higher in B. Š. However, in a 30-second (Wingate) test which reflects a mixed anaerobic alactic and glycolytic work capacity were most often higher in K. P.

Anaerobic glycolytic capacity kept also improving during the whole preparatory period. At the beginning of the preparatory period the results of rowing for 500 m were 1.31,5 and 1.32,5 min. respectively. Three weeks before the Olympic Games, the results of this test improved up to 1.27,3 and 1.29,6 min.

A very important information about the adaptation of the athlete's organism to physical loads is provided by critical intensity limit indices. Data in Table 3 shows that the indices of aerobic capacity VO_{2max} as well as working capacity at the critical intensity limit during the whole annual preparatory cycle kept increasing and reached the highest values before the most important competitions of the season. The working efficiency of the rowers was high.

The bioenergetic indices of the girls at the anaerobic metabolism threshold limits also were very informative where the organism's adaptation to physical loads was concerned. The anaerobic metabolism threshold in the sportswomen under discussion approached the critical intensity limit up to 80-90%, which is undoubtedly a positive index showing 'good fitness'.

Table 1. Diagram of Lithuanian women double scull crew K. P. and B. Š. training loads in the year of 1999 - 2000

Months		October	November	December	January	February	March	April	May	June	July	August	September	Plan realization
Training loads (h)	GPP	6	56	51	64	54	19	10	15	13	16	10	9	323
	SPP						51	76	96	62	86	66	26	463
Load	TOTAL	6	56	51	64	54	70	86	111	75	102	76	35	786
Competitions								2	1	2	1	1	1	
Training camps					20d.	26d.	31d.	28d.	31d.	16d.	22d.	24d.	15d.	226d.
Testings		+		+				+		+		+		
Training zones intensity (h)	I	6	50	27	30	22	40	26	30	20	40	34	14	339
	II		6	20	22	17	26	44	46	15	20	15	10	241
	III			4	10	12	3	12	28	30	33	20	6	158
	IV				2	3	1	4	6	8	8	6	4	42
	V								1	2	1	1	1	6
	TOTAL		6	56	51	64	54	70	86	111	75	102	76	35

Table 2. Dynamics of aerobic and anaerobic capacity indices in Lithuanian rowers during the last year of preparation for Olympic Games

	Exami- nation date	Body mass kg	SMCC kgm/s/ kg	AAMC kgm/s/ kg	Rowing power, W					Critical intensity limit				Anaerobic metabolism threshold			
					10 sec. mo- men- tum value	10 sec. ave- rage value	30 sec. W	500 m, W	Time, min.	LV, l	PR, b/min	VO2 max, ml/kg	W	LV,l	PR, b/min	VO2ma x, ml/kg	VO2% of VO2max
1	1999	77,0	1,47	1,43													
	10 19	83,0	1,74	1,31													
2	2000	77,0	1,50	1,47	706	577	679	456	1,31,5	159,1	183	55,2	380	99,0	163	46,7	77,7
	02 09	80,5	1,84	1,46	710	575	570	441	1,32,6	136,9	179	58,4	400	121,7	164	51,0	89,8
3	2000	74,3	1,89	1,22	706	575	578	488	1,29,5	175,4	184	63,3	415	115,0	170	56,3	88,8
	04 20	80,0	1,89	1,45	721	598	566	450	1,31,9	142,0	177	57,6	400	114,0	169	51,3	88,9
4	2000	75,0	2,09	1,43						166,8	184	59,6	420	122	167	50,1	80,2
	06 29	80,5	2,51	1,33						163,8	185	59,8	420	99,0	160	47,5	75,4
5	2000	76,0	2,28	1,54	712	593	688	508	1,27,3	165,0	184	62,7	430	97,0	167	43,8	70,2
	08 28	81,3	2,46	1,46	743	601	652	486	1,29,6	165,0	184	54,1	430	107,0	166	39,2	71,7

Conclusions

1. Regular examinations of highly skilled rowers, planned in the annual preparatory cycles and in the related schemes of organizational measures for a four-year pre-Olympic period allowed for accumulation of very important information about the dynamics of physical loads, adaptation to processes and consequently a proper management of the period of training.
2. A well-arranged, timely upgraded and well-controlled process of training allowed a constant improvement of the indices of physical development, physical capacity in various energy production zones, with their highest values reached in the final stage of the pre-Olympic period.
3. At the end of the preparatory period and during the competition period, a tendency for the anaerobic metabolism threshold to approach the critical intensity limit has been observed. The most informative index of this shift is the percentage of oxygen uptake from VO_{2max} at the anaerobic metabolism threshold limit. The Lithuanian women rowers - participants of the Sydney Olympic Games exhibited very high oxygen uptake indices (70-90% of VO_{2max}) at this limit.

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