

## STUDY OF SPECIAL PERFORMANCE AND VOLUME TRAINING LOADINGS AT SWIMMERS IN THE YEAR PREPARATION

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**Annotation.** *Purpose:* to study the dynamics of the special performance and volume of training load during annual training swimmers. *Material / Methods:* The study involved 14 teams of students of Kharkiv universities. All swimmers are of high qualification. Motor tests of special performance swimmers, functional tests were used to confirm the effectiveness of the training process. *Results:* The dynamics of special performance indicators and volume of training load of highly qualified swimmers in the annual cycle of training. Determined part of aerobic (58.3 %), aerobic-anaerobic special (34.5%), anaerobic- glycolytic (5.5%), anaerobic- alactate (1.7%) loadings in the direction of total training load for the academic year. *Conclusions:* In preparing swimmers stayer is the most appropriate single-cycle construction of the annual cycle, and for swimmers, sprinters should be based on two-cycle version of the load distribution.

**Keywords:** swimmers, special, performance, volume loading.

### Introduction

Rational construction of yearly training is influenced by a number of factors.

First, training and competition loads already have reached high level and it complicates construction of training process. New approaches to dynamic of training and competition loads are required.

Secondly, it is influenced by intensive progressing of swimming in different countries and its commercialization [10]. In literature there is much information about construction of yearly training of high class swimmers on the base of two-three cycles' planning [6, 9]. It has been convincingly proved that formation of rational organism's adaptation of sportsmen, which ensure achievement of highest results in competitions, depends on rational construction of yearly training [9, 11].

Modern training process of high class swimmers is characterized by great scopes of work, its high intensity, by wide usage of different recreational means and so on.

Speaking about parameters of swimmers' training it should be mentioned that its total scope exceeds 2500-3200 km; trainings are conducted practically the whole year, twice a day and on the most tensed stages up to three times a day.

It is natural that work at such level would be impossible without profound knowledge of laws, which are in the base of revelation of training's profile tasks, without selection of optimal methods and means of their solution in the frames of training micro-cycles, periods and stages of trainings.

Studying of practical experience showed that at present intensification of trainings can be realized in several directions:

- 1) increasing of scope of work at some trainings;
- 2) increasing of quantity of trainings up to 2-3 and more during a day;
- 3) increasing of quantity of trainings with high loads in a micro-cycle;
- 4) increasing of intensity of trainings' work [6,9, 12].

Main purpose of training process in sports is increment of sport results. Maximizing of sport results' increment is ensured by rational application of different means on different training stages and in training season [3, 13]. In theory and methodic of swimming determination of optimal scopes and correlation of means of different orientation in sportsmen's individual training have not been elucidated sufficiently [1, 14, 15]. Scientific solution of this problem is reduced to determination of dependence of special workability criteria's increment on scope of training means, which are used at different stages of training.

The research has been fulfilled as per plan of S&R works of National university "Law academy of Ukraine, named after Yaroslav Mudriy".

### Purpose, tasks of the work, material and methods

*The purpose of the research* was studying of dynamics of special workability's and training loads' indicators in process of yearly training of swimmers-students as well as determination of targeted functions, which connect increment of special workability's indicators with scopes of fulfilled training work.

#### *Organization of the research.*

In the research, which was being carried out during academic year, 14 students of law academy and poly-technical university took part. All swimmers were of high qualification (6 CMS and 8MS).

During season we fulfilled eight stage examinations (see table 1). For determination of special workability we used the following tests, executed in natural conditions of swimming:

- repeated swimming with rising speed 5x200 m with 3 minutes rest pauses. Swimming speed increased with every repetition by 5%, starting from 80% and up to maximal possible;
- test of repeated swimming at maximal speed 4x50 m with 15 sec. rest pauses;
- control swimming at 800 meters distance with maximal speed.

Table 1

<i>Time of examinations</i>			
№ of examination	Period of training	Month	Week of training cycle
First, preparatory			
1	beginning	September	2-3
2	middle	November	10-11
3	end	January	19
First competition			
4	middle	January	20
Second preparatory			
5	beginning	February-March	26-27
6	middle	April	31-32
7	end	May	37-38
Second competition			
8	middle	June	44

Sampling of exhaled air was carried out just after finishing of exercise. Gases analysis was fulfilled with apparatus of Holden.

By results of test with increasing load we determined: critical speed ( $V_{cr}$ ), maximal consumption of oxygen (MCO), swimming speed, corresponding anaerobic threshold ( $V_{pano}$ ), lungs' ventilation (VE), heart beats rate at different levels of energetic demand (HBR  $pano$ , HBR  $cr.$ , HBR  $max.$ ), power of load at anaerobic threshold ( $W_{pano}$ ).

Oxygen income during exercise ( $O_2$ -income) was determined as production of 800 meters swimming time by IIK level, just after finishing of exercise.

Quality metering analysis of training loads was carried out with the help of 4 rank classification by zones of selective orientation of exercises' physiological influence [1, 2].

Statistic analysis included calculation of mean group confidence of differences by t-criterion of Student.

#### Results of the researches

Total scope of load during season was  $740.0 \pm 139.92$  hours. From them anaerobic loads – 58.3%, mixed, aerobic-anaerobic – 34.5%, anaerobic-hlycolitic 5.5%, anaerobic-lactate 1.7%. The work, fulfilled by swimmers out of water was 3-36% of total scope, depending on stage of training.

In every half-year cycle there exist preparatory and competition periods. In its turn preparatory period consists of general-training and special training sub-stages. For every of these sub-stages correlation of training loads of different purpose and degree of specificity of the applied means are characteristic.

Table 2

Purpose	I preparatory period			I competition period	II preparatory period			II competition period	Total in year
	1 stage	2 stage	Total for period		1 stage	2 stage	Total for period		
$\bar{X} \pm \sigma$									
Aerobic, hours	84.6 $\pm 25.5$	94.9 $\pm 19.4$	180.67 $\pm 31.2$	28.6 $\pm 31.2$	79.3 $\pm 6.6$	70.7 $\pm 10.3$	150. $0 \pm 14$	91.2 $\pm 20.8$	448 $\pm 77$
Mixed, aerobic-anaerobic, hours	87.2 $\pm 35.2$	35.1 $\pm 9.1$	112.3 $\pm 30.2$	6.6 $\pm 5.3$	39.0 $\pm 14.0$	37.3 $\pm 12.4$	76.3 $\pm 23.2$	37.3 $\pm 11.9$	242 $\pm 76$
Anaerobic-hlycolitic, hours,	7.2 $\pm 2.8$	11.2 $\pm 5.1$	18.9 $\pm 6.2$	2.7 $\pm 1.5$	.9 $\pm 1.6$	9.1 $\pm 4.2$	13.0 $\pm 5.2$	5.9 $\pm 2.6$	41.5 $\pm 15$
Anaerobic – lactate, hours	1.5 $\pm 2.4$	2.5 $\pm 1.2$	4.0 $\pm 2.3$	2.2 $\pm 1.0$	0.8 $\pm 0.4$	3.3 $\pm 1.3$	4.1 $\pm 1.4$	2.3 $\pm 1.8$	12.6 $\pm 7.6$
Total scope, hours	181.9 $\pm 61$	144.9 $\pm 30$	326.8 $\pm 68,5$	40.1 $\pm 14.7$	2.30 $\pm 18$	120.4 $\pm 22$	243.4 $\pm 36.9$	136.7 $\pm 24.8$	740 $\pm 14$

Mean group data about scopes of training loads of different purpose. Executed at different stages of swimmers' training are presented in table 2.

Data about dynamic of students' special workability, registered at different stages of training, are give in table 3.

Confident changes during academic year were registered in indicators of aerobic productivity (MCO, V pano, Wpano) and time of test's 4x50 m fulfillment ( $p < 0.05$ ).

During season and up to the end of second preparatory period we registered continuous increasing of MCO. It decreased a little only in second competition period.

Table 3

*Dynamic od special workability's indicators at stages of yearly training*

Indicators	I preparatory period		I competition period	II preparatory period		II competition period
	beginning	end		beginning	end	
HBR max.	182 ±11	184 ±12	182± 9	179± 8	184 ±7	179± 4,5
HBR cr.	180± 12	182± 3	179 ±11	177± 9	182± 7	178 ±30
HBR pano	152± 5	150± 9	156± 11	159± 13	158 ±56	162 ±6
MCO l.p.m.	3.86± 3.1	3.96 ±0.3	4.09± 0.2	4.31± 0.4	4.5 ±0.3	4.9± 0.5
VE, l.p.m.	104.3 ±8	106± 18.2	111.3 ±16	113.1 ±11.9	122.1 ±10.4	126 ±10.8
W, pano,%	63.6 ±4.1	65.3± 10.1	74.0 ±5.9	67.9 ±7.7	74.9 ±7.2	75.4± 11.7
t 800, sec.	586.8± 8.5	580± 17.1	571± 23	572± 26. 3	552±21	549± 18.3
O2, income, l.	30.1 ±2.4	30.5± 2.8	30.7± 3.8	32.42 ±5.5	33.1 ±4.8	34.97± 2.8

In other indicators of aerobic abilities ( $\text{o}_2$  income, W pano) also there was noticed a trend for increasing during training season. HBR max. and HBRcr. were relatively stable. In contrast to these values, HBR pano substantially varies during year, increasing by the end of season in averaged by 10 strokes.

Increment of maximal time in control 800 meter's swimming (t 800) increased in linear way with increasing of scope of all training exercises.

Increment of MCO increases with rising of aerobic by more than 200 hours and aerobic-anaerobic by more than 75 hours.

Basing on the presented data, which connect changes of special workability's indicators with scope of executed works we can determine optimal scopes, ensuring the highest increment of organism's functional characteristics.

Analysis of numerous researches [1,4,5] points at importance of determination of rational correlation between loads of different influence on different stages pf training as well as determination of certain sequence of their application in a season.

The highest share of load at all stages of training belongs to aerobic and aerobic-anaerobic ones. Substantial changes of loads' scope of aerobic-anaerobic orientation during yearly cycle witness that this kind of training exercises is used as main regulating element for development of sportsmen's endurance [2].

Application of aerobic loads facilitates not only increasing of general endurance but, at the same time, creates pre-conditions for development of special endurance mechanisms.

It should be considered that sharp increasing of aerobic-anaerobic loads at early stages of yearly cycle can negatively influence on progress of sport results [2, 5].

By the end of second preparatory period we noticed maximal changes in aerobic power's indicators. Indicators of anaerobic productivity did not substantially change with realization of our training program.

Effectiveness of the applied means and methods shall be determined on the base of dependence "doze-effect" [1,5]. In our research doze was scope of load of certain purpose, while achieved effect was evaluated by changes of special workability's indicators.

Cumulative effect of aerobic and aerobic-anaerobic loads' application is expressed in significant improvement of aerobic productivity's indicators with simultaneous worsening of anaerobic hlycolitic indicators.

#### **Conclusions:**

1. Dynamic of special workability's indicators in yearly training cycle is determined by selected orientation of training process. With total yearly scope of training loads 740 hours, share of aerobic loads is 58.3%, share of aerobic-anaerobic loads is 34.5%, share of anaerobic-hlycolitic loads is 5.5% and anaerobic-lactate – 1.7%. With it we registered confident increasing of aerobic abilities. Indicators of anaerobic abilities did not substantially increase.
2. Improvement of swimmers' hlycolitic abilities was registered with using of anaerobic-hlycolitic loads. Substantial increasing of aerobic loads results in reducing of anaerobic indicators.
3. When training of long distance swimmers, whose energetic demand is satisfied by aerobic sources, the most purposeful is one-cycle yearly cycle with relatively significant share of anaerobic loads in total scope of training work.

When planning training of sprinter swimmers it would be useful to base on two-cycle variant of loads' distribution.

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