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Effects of the Basic Period in Swimming Training with the Age Group

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Abstract

Development of aerobic capacity and endurance is important part of basic period in swimming training for age groups. The focus of this study was monitoring the progress of a group of 17 male swimmers, aged between 12 to 14 from HAPK Mladost, Zagreb. They were tested throughout basic period over 3 consecutive years (2016-2018). For this purpose, the training effects were measured by three tests: speed (25 m freestyle), speed endurance (6x50 m freestyle) and endurance (1500 m freestyle). Initial testing was performed after 2 weeks of adaptation while final testing was completed in the 12th week of each of basic period through all three years. Descriptive statistics were used to analyze the effects of the basic period. T-test showed statistically significant positive outcomes in all test results during 3 years of basic training (12 weeks per year). As a conclusion progress of the speed test was found increased with each year while progress of the remaining two tests decreased with each additional year. Swimmers that were measured in this research have won first place at National championship. As a result, the existing training plan for the age group was concluded to be used further. This research provided guidelines for further planning of swimming training.

Key words: *swimming, endurance, speed, age group*

Introduction

According to Theory of block periodization (Issurin, 2008) the goal of basic period in swimming training is development of basic endurance. The purpose of this study was to monitor the progress of a group of male swimmers in the basic period during 3 years (2016-2018). Basic period lasted 12 weeks. Total load and zones of intensity were defined in annual plans. The training effects were measured by speed, speed endurance and endurance tests. Initial testing was done after 2nd week, while final testing was completed in week 12. Zones of intensity for particular age (12-14) were supposed to stimulate development of endurance in basic period. This approach is compatible with World Health Organization (2010) recommendations that emphasize the importance of developing the aerobic endurance in age group. According to Olbrecht (2000), Armstrong and Barker (2011), possible progress in the increasing in VO_{2max} in one swimming se-

ason is 15-20%. The other authors (Behringer, Heede, Matthews, & Mester, 2011; Bompa & Buzzichelli, 2015) find greater impact in the development strength in that age. Speed and speed endurance had to be maintained at initial level in the same period. During specific and competition period, endurance had to be maintained while speed and speed endurance had to be developed (Leko, Karaula, & Šiljeg, 2017).

Methods

Participants

The sample consisted of 17 male swimmers, aged between 12 and 14 during 3 years. All of them are participating of training programs at "HAPK Mladost" swimming club. All participants were in good health, and they conducted swimming program during basic period of 3 years. Swimming program was carried out six times per week, where length of training session was 2 hours. The testing was undertaken at 25 m swimming



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pool in Zagreb. Measurements were done in accordance with ethical principles and all of the tests were conducted by the same person. The testing procedure was standardized for all swimmers.

Materials and Procedure

Swimmers were tested in specific motor skills. Three tests were used: speed (25 m freestyle), speed endurance (6x50 m freestyle, with start on every 60 s) and endurance (1500 m freestyle). The 25 m, 6x50 m and 1500 m tests were used in the assessment of swimming speed applying the freestyle technique. Swimmers swam in period of 3 days starting with 25 m freestyle, second day 6x50 m freestyle and third day 1500 m freestyle. During research over period of 12 weeks, mentioned parameters were followed during the basic cycle. At the beginning of the winter season and before measurement commenced, two weeks of adaptation were carried out. After these two weeks, initial testing was done at the beginning of the basic cycle. The final test was conducted during the last days of week 12. The task was performed in the water and at the starter's signal by pushing

from the wall. The result was measured by Omega electronic with one hundredth of a second accuracy.

Statistical analysis

The basic descriptive indicators for certain tests were calculated (means, minimum, maximum and standard deviations). In the t-test, statistically significant differences were determined between the initial and final results ($p < 0.05$), in all three tests. For all the analyses, Statistic for Windows 13.4, statistical software package was used to compute and report the data. Descriptive statistics were used to analyze the effects of the basic period. The normality of distribution for each variable was tested. T-test was used for each of the tests within 3 years.

Results

Based on the results of the descriptive statistics it can be concluded that in all three observed years, the training program caused changes in the swim speed test, speed endurance test and endurance test during 12 week of basic period. Positive effects grew in each of the three observed years (Table 1).

Table 1. Descriptive statistic for variable 25 m freestyle, 6x50 m freestyle i 1500 m freestyle in initial (INI) and final (FIN) tests in 2016, 2017 and 2018 years (N=17)

Variable	Descriptive Statistics		
	Minimum	Maximum	M±SD
2016 25 m INI	15.58	19.14	16.78±1.01
2017 25 m INI	14.43	17.43	15.68±0.90
2018 25 m INI	14.14	17.05	15.39±0.90
2016 25 m FIN	14.84	18.81	16.46±1.07
2017 25 m FIN	14.02	17.14	15.31±0.85
2018 25 m FIN	13.80	16.30	14.85±0.75
2016 6x50 m INI	34.22	44.12	38.86±2.80
2017 6x50 m INI	33.09	39.45	35.71±2.30
2018 6x50 m INI	31.65	37.89	34.54±2.16
2016 6x50 m FIN	32.87	40.41	36.34±2.40
2017 6x50 m FIN	31.09	37.40	33.77±1.98
2018 6x50 m FIN	30.36	36.77	33.21±1.86
2016 1500 m INI	1236.30	1527.62	1400.47±94.09
2017 1500 m INI	1167.18	1466.43	1280.58±90.48
2018 1500 m INI	1128.55	1396.11	1254.08±82.48
2016 1500 m FIN	1185.81	1479.11	1310.79±90.54
2017 1500 m FIN	1115.11	1330.71	1213.76±76.14
2018 1500 m FIN	1100.18	1359.02	1210.7370.61

Reference to Table 1 it is apparent that dispersion measures for the tests are decreasing. However, it can be noted that

dispersion of results increases at the beginning of the season while dispersion decreases in the final measurement.

Table 2. T-test for Variables 25 m freestyle, $p < 0.05$

Variable	M±SD	N	Diff.	Std.Dv. Diff.	t	df	p	Conf. -95.00%	Conf. +95.00%
2016 25 m INI	16.75±1.00	24	0.35	0.49	3.43	23	0.00	0.13	0.55
2016 25 m FIN	16.40±1.09								
2017 25 m INI	15.68±0.90	17	0.38	0.34	4.45	16	0.00	0.19	0.55
2017 25 m FIN	15.30±0.85								
2018 25 m INI	15.38±0.90	17	0.53	0.33	6.66	16	0.00	0.36	0.70
2018 25 m FIN	14.85±0.75								

Based on the results of the t-test it can be concluded that in all three observed years, the training program caused sta-

tistically significant changes in all swim speed test through 12 weeks (Table 2, 3 and 4).

Table 3. T-test for Variables 6x50 m freestyle, $p < 0.05$

Variable	M±SD	N	Diff.	Std.Dv. Diff.	t	df	p	Conf. -95.00%	Conf. +95.00%
2016 6x50 m INI	39.22±2.88	24	2.44	1.18	10.06	23	0.00	1.93	2.94
2016 6x50 m FIN	36.78±2.54								
2017 6x50 m INI	35.70±2.30	17	1.93	0.69	11.48	16	0.00	1.57	2.29
2017 6x50 m FIN	33.77±1.98								
2018 6x50 m INI	34.54±2.16	17	1.324	0.77	7.06	16	0.00	0.93	1.72
2018 6x50 m FIN	33.21±1.86								

Better results are obvious in final tests in all three years. Unlike the speed test (25 m freestyle) and speed endurance te-

sts (6x50 m freestyle), progress of endurance test in the results (1500 m freestyle) is decreasing over the three observed years.

Table 4. T-test for Variables 1500 m freestyle, $p < 0.05$

Variable	Mean	SD	N	Diff.	Std.Dv. Diff.	t	df	p	Conf. -95.00%	Conf. +95.00%
2016 1500 m INI	1408.18	96.37	24	78.82	41.91	9.21	23	0.00	61.12	96.52
2016 1500 m FIN	1329.35	96.62								
2017 1500 m INI	1280.58	90.47	17	66.82	38.79	7.10	16	0.00	46.87	86.76
2017 1500 m FIN	1213.75	76.13								
2018 1500 m INI	1254.07	82.48	17	43.35	40.44	4.41	16	0.00	22.55	64.14
2018 1500 m FIN	1210.72	70.61								

Discussion

Based on recent researches, some authors have argued that simultaneous training of different motor or functional abilities can cause limitation of development or even decline in some abilities (Issurin, 2008; Maglischo, 2003). For this reason, the training program applied in this research primarily wanted to develop the aerobic endurance and swim strength (WHO, 2010). Speed and speed endurance were represented with a very small percentage during basic training program in overall. Such approach relied on the findings of Maglischo (2003), which warned the mutually negative effects of endurance and speed. The author explained that if you train endurance the results in speed will be worse and vice versa. Analyzing the results of initial and final tests and all observed variables over a three-year period, it can be concluded that swimmers had better swimming time in the initial results of 2017 compared to the final state of the previous 2016. However, in 2018 initial swimmers' status observed through all three observed variables were worse compared to the final results of 2017. This particularly refers to the level of aerobic ability where the swimmers in the 1500-meter freestyle test had an initial result in 2018 worse by 40.32 seconds compared to the final result in 2017. At the same time, the result of a speed endurance was worse for 0.77 seconds. As an age group category of 12-14 years old, where aerobic capacity development is a priority, it is apparent that in the period from January 2018 to August 2018 work on aerobic capacity development was insufficient and did not produce stabilization or development of aerobic abilities. Endurance test (1500 m) showed statistically significant progress in basic period 2016-2018 (1,29.6-1,06.8-43.3 respectively). Statistically significant progress was also recorded in speed test (25 m) (0.32-0.37-0.53 respectively) and speed endurance test (6x50 m) (2.52-1.9-1.3 respectively) in 3 observed years in basic period of training cycle. This data differs from some of the previous claims (Maglischo, 2003), which noted the conflict between endurance development and speed in the same period. During the observed period all tests showed

progress, but the progress of the speed test increased with each year while progress of the remaining two tests decreased with each additional year. In a future it may be possible to increase the volume of training in aerobic zones. That will cause greater impact on endurance and limiting progress in speed and speed endurance. Swimmers that were measured in this research have won first place on National championship. So, the existing training plan for the age group should be used further. This research has provided guidelines for further planning of swimming training. In the last year of research, swimmers are at an age when they enter a puberty (14 years). So the increase in swimming speed can be attributed to rapid growth and strength (Behringer et al., 2011; Bomba & Buzzichelli, 2015). In the first two years of research, when swimmers had 12 and 13 years, this cannot be an argument. The advantage of this research, considering training of group of swimmers 12-14 age, is that excluding anaerobic zones in training process is unnecessary. In future studies, the authors suggest to follow up on group of swimmers age 12-14 regarding their anthropometrical characteristics and further on to analyze strength test results. Practical implication of this research is to redefine intensity zones in training of swimmers age 12-14 in basic period by including more of anaerobic intensity zones, especially the sprint zone. The results showed improvement in all tests (speed, speed endurance and endurance) throughout 12-week period of basic preparation in age group. Same tests were performed every year at the same periods. Results measured progressively improved. The highest improvement was in speed test although training program was set for improving of basic endurance. One of conclusions of the research showing no conflict between development of basic endurance and speed for group of swimmers 12-14 age.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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