

## IMPROVED GENERAL PHYSICAL FITNESS OF YOUNG SWIMMERS BY APPLYING IN THE TRAINING PROCESS OF ENDOGENOUS HYPOXIC BREATHING TECHNIQUES

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**Annotation.** *Purpose:* to examine the effect of general physical preparedness of young swimmers in the body artificially created state hypercapnic normobaric hypoxia. *Material:* the study involved 21 swimmer aged 13-14 years with sports qualifications at third and second sports categories. *Results:* the original method of working with young swimmers. Studies were conducted for 16 weeks a year preparatory period macrocycle. The average value of the index on the results of general endurance races 800m improved by 2.80 %. 8.24 % increased speed- strength endurance and 18.77 % increased dynamic strength endurance. During the period of formative experiment performance speed, agility, static endurance, flexibility and explosive strength athletes first experimental group was not significantly changed. *Conclusions:* it was found that the use of the proposed technique provides statistically significant increase in overall endurance, speed strength endurance and dynamic strength endurance.

**Keywords:** *swimming, hypoxia, hypercapnic, physical, preparedness.*

### Introduction

Physical preparation of swimmers is a major part of the sports training that is sent to the improvement of physical abilities [5]. Forcing of process of physical preparation of teen age's swimmers on the previous base stage preparation due to the increase of volume and intensity of the training load can disrupt the balanced activity of those organism's functional systems, which are determinative for the process of the physical improvement of sportsman on the next stages of long-term training, and at the same time can negatively influence on the dynamics of sports achievements [3,5,6,7]. Therefore in our opinion it is necessity to search additional ways which would strengthen the effect of physical activities without the increase of volume and intensity of training work.

The sportsman's ability to demonstrate sports mastery in swimming is predefined by ability effectively perform physical work in the state of the so-called hypermetabolic hypoxia(hypoxia of physical activity) [4,5]. Therefore in sport practice there is a necessity of search and application of methods and techniques that held to improve the adaptation of sportsmen to the hypermetabolic hypoxia. One of such methods is training in mountains in height over 1500 m above a sea level. However with the increase of height the partial pressure of gases in the inhaled air is directly proportional reduced and that lead to the decline of efficiency of muscular activity in the conditions of highland as a result decrease of the gradient pressure is negatively influencing on the transport of oxygen to tissue. Using of such model of the hipoxic training by sportsmen-teenagers are especially dangerous, because the improving of sports mastery of young sportsmen takes place on a background intensive alteration of organism [1,2]. According to some authors [2, 9, 10] the methodologies of creation in the organism the state of hypoxia in normobaric terms are considered safer and no less effective for the increase of physical level preparation. One of such methodologies is methodology of the "endogenous hypoxic breathing" with using the vehicle «Endohenik -01", that allows to create the state of moderate hypoxia and hypercapnia in an organism.

So, we hoped, that complex application of physical exercises and methodology of the endogenous hypoxic breathing with using the vehicle "Endohenik -01" in complex preparation of young swimmers would assist the increase their level of general physical preparation.

The results of this scientific article are the fragment of a planned research subjects of the Department of Biomedical foundations of physical education and physical rehabilitation of the Vinnitsa State Pedagogical University named after Mikhail Kotsubyns'kyi under the consolidated plan of research work of the Department of Education and Science of Ukraine in the sphere of physical culture and sports in 2011-2014 on the topic 9027 "The optimization of the process of improving the physical and functional preparation of students and pupils by physical activities of different aspiration" (registration number – 0113U007491).

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

To set the efficiency of influence of artificially body condition of normobaric hiperkapnic hypoxia on general physical preparation of young swimmers.

#### Task:

1. To determine the influence of physical activities according the program for CYSS (Children and Youth Sports School) without and with the application of methodology of the endogenous hypoxic breathing on general physical preparation of teenagers in a preparatory period of annual macrocycle.

### The methods and organization of the research.

For the decision of put tasks such methods were used: review of literature, pedagogical observation, pedagogical experiment, pedagogical testing of the special physical preparation and methods of mathematical statistics.

Before the beginning of forming experiment sportsmen had passed a typology selection and by the method of random sampling were divided into two groups - control (CG, n=10) and basic (BG, n=11). All swimmers were training 6 times a week according to the typical program of sports preparation for CYSS. Sporting experience of investigated was 4-5

years, and qualification at the level of the second and third sports class. The difference between the classes for sportsmen of basic group is consisted of application during every training on the land the methodology of the endogenous hypoxic breathing (EHB) with using the vehicle " Endohenik -01" according to the so-called "route maps", that caused in an organism the state of moderate hypoxia and hypercapnia at the constant parameters of the oxygen content (of 18%) and carbon dioxide (3%) [ 8 ].

The inspection for swimmers was conducted during preparatory period of annual macrocycle in three stages: before the experiment and after 8 and 16 weeks from the beginning. During 16 weeks of forming experiment we were studying a complex influence of trainings and methodology of the endogenous hypoxic breathing on general physical preparation of swimmers 13-14 years old. For the estimation of general physical preparation we used next test exercises: running on a 60 m and 800 m, long jump from a place, raising in sitting from the position of lying after 1 min, "trick" by direct hands, shuttle run 4 x 9 m, bending and unbending of hands during lying, hang on bent arms.

For determination the efficiency of influence the complex application on physical activity and methodology of the endogenous hypoxic breathing on physical preparation of young swimmers we compared the mean arithmetic values of the constrained selections, and reliable differences between them were determined by Student's test.

### Results of the researches

The results of the state experiment of general physical preparation of the control and experimental groups were not significantly different ( $p > 0.05$ ) (Table 1, Table 2). The results of the research indicate that after 8 weeks from the beginning of the experiment in control (CG) and basic (BG1) groups probable developments of general physical preparation have not been identified. However, after 16 weeks from the beginning of the experiment in the control group speed-strength endurance is increased on 8,21 % by the number of times raising in the sitting from the laying position for 1 min ( $p < 0.05$ ), and dynamic strength endurance of the shoulder zone muscles is also increased on 8,21 % by the maximum possible number of times bending and unbending hand during lying (at 22.86 %,  $p < 0.05$ ).

Table 1

*Swimming training influence according to the program of CYSS on general physical preparation of group's swimmers CG (n=10)*

Tests	Average quantity, $\bar{x} \pm S$			T	
	before the beginning of the training	after 8 weeks from the beginning of the training	after 16 weeks from the beginning of the training	after 8 weeks	after 16 weeks
"Trick" by direct hands ,cm	55,0±2,2	54,2±2,49	53,0±2,17	0,24	0,65
Running 60 m, sec	9,7±0,25	9,64±0,24	9,5±0,24	0,35	0,59
Running 800 m, min.	3,433±0,03	3,417±0,02	3,404±0,02	0,44	0,81
Long jump from a place, cm	179,3±4,87	181,0±4,33	182,7±4,11	0,26	0,53
Raising in sitting from the position of lying after 1 min, sec	46,3±1,19	47,1±1,62	50,1±1,08*	0,4	2,36
Bending and unbending of hands during lying, times	17,5±1,3	19,0±1,08	21,5±0,97*	0,88	2,47
Shuttle run 4x9 m, sec	10,9±0,2	10,86±2,38	10,83±0,24	0,02	0,3
Body's bend forward from the sitting position, cm	7,5±0,97	8,1±0,87	8,3±0,76	0,46	0,65
Hang on bent arms, sec	21,0±2,49	22,1±2,6	22,3±2,6	0,31	0,36

Remarks. Probable difference of the relative quantities recorded prior to forming experiment: \* -  $p < 0.05$

Trainings according to the program of sports training for youth swimming schools during the experimental period for the sportsmen in control group did not assist the increase the indexes of general endurance after the result of running on 800 m, static endurance by test with hanging on bent arms, speed results on running at 60 m, flexibility as a result of "trick" by direct hands, explosive power as a result of the long jump from a place and agility after the result of «shuttle run» 4x9. Unlike the sportsmen in the control group, the first basic group swimmers who used the "EHB" methodology during the training and after 16 weeks from the beginning of the experiment significantly increased formative indicators of general endurance, speed-strength endurance and dynamic strength endurance (Table 2).

Table 2

*Swimming training influence according to the program of CYSS with using methodology of EHB on the testing results of general physical preparation of group's swimmers BG (n=11)*

Tests	Average quantity,, $\bar{x}\pm S$			t	
	before the beginning of the training	after 8 weeks from the beginning of the training	after 16 weeks from the beginning of the training	after 8 weeks	after 16 weeks
"Trick" by direct hands ,cm	53,18±2,49	52,73±1,97	52,09±1,97	0,14	0,34
Running 60 m, sec	9,2±0,2	9,18±0,17	9,16±0,15	0,08	0,16
Running 800 m, min.	3,431±0,03	3,375±0,02	3,335±0,02*	1,4	2,4
Long jump from a place, cm	188,18±4,83	190,27±4,93	191,91±4,63	0,3	0,56
Raising in sitting from the position of lying after 1 min, sec	42,0±0,986	43,27±1,38	45,46±0,89*	0,75	2,6
Bending and unbending of hands during lying, times	18,91±0,986	20,55±0,79	22,46±0,79*	1,30	2,82
Shuttle run 4x9 m, sec	10,66±0,25	10,58±0,22	10,55±0,21	0,05	0,33
Body's bend forward from the sitting position, cm	10,18±1,18	10,64±1,08	10,7±0,99	0,29	0,34
Hang on bent arms, sec	19,46±2,07	20,36±2,07	20,73±2,07	0,31	0,43

Remarks. Probable difference of the relative quantities recorded prior to forming experiment: \* -  $p < 0.05$

The average quantity of the index for general endurance race results at 800 m improved to 2.80%, the 8.24% increase in speed-strength endurance and increased to 18.77% dynamic power endurance. However, during the period of forming experiment speed, agility, static endurance, flexibility and explosive power indexes in first experimental group sportsmen did not change significantly ( $p < 0,05$ ).

#### Conclusions:

Trainings according the program of sports training for youth swimming schools improve speed-strength and dynamic strength endurance. Complex application of physical exercises and artificially created state of moderate hypoxia and hypercapnia in the swimmers body of 13-14 years in the preparatory period of annual macrocycle on the stage of previous basic training allows you to increase not only the speed-strength and dynamic strength endurance, but overall endurance.

It is planned to conduct the research of the efficiency of the artificial creation the hiperkapnich hypoxia state in an organism on specific functional physical preparation of 13-14 years old swimmers.

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