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SIMULATION OF THE YEARLONG CYCLE OF TRAINING OF ATHLETES IN AEROBIC GYMNASTICS AT THE STAGE OF SPECIALIZED BASIC TRAINING

Valentyna Todorova[1]

Inna Bodrenkova[2]

Tetiana Moshenska[3]

State institution «South Ukrainian National Pedagogical University named after K. D. Ushynsky»[1]*,*
Odessa, Ukraine.
Yaroslav the Wise National University of Law[2]*,*
Kharkiv, Ukraine
Kharkiv State Academy of Physical Culture[3]*,*
Kharkiv, Ukraine

Purpose: to develop a model of the annual training cycle for athletes 12-14 years old, specializing in aerobic gymnastics, based on the well-known methodology in complex coordination and gymnastic sports, taking into account the specifics of this sport.

Materials and methods: the study involved 24 athletes aged 12-14 years (girls). Research methods: analysis and generalization of scientific and methodical literature data, pedagogical observation, pedagogical testing, pedagogical experiment and methods of mathematical statistics.

Results: the specificity of aerobic gymnastics as a sport has been investigated. Revealed and practically substantiated effective means, methods and training loads of the stage of specialized basic training. The level of development of physical qualities, special physical fitness and technical skill of athletes 12-14 years old has been

determined and established. It has been experimentally proved and mathematically proven that the developed model of the annual training cycle is the most effective for determining the readiness for competitive activity of 12-14 year old athletes engaged in aerobic gymnastics at the stage of specialized basic training.

Conclusions: the proposed model of the annual cycle of training athletes aged 12-14, engaged in aerobic gymnastics at the stage of specialized basic training leads to increased development of individual physical qualities, increasing the level of special training and athletes gain stability and quality of technical elements.

Keywords: aerobic gymnastics, model, annual training cycle, athletes 12-14 years old, stage of specialized basic training.

Introduction

Aerobic gymnastics is one of the modern sports. Currently, the International Federation of Aerobic Gymnastics unites the national federations of many countries [3, 6]. It is complex, spectacular and at the same time accessible sport for people of all ages and genders. The growing interest in aerobic gymnastics, its geographical expansion, the holding of European, Ukrainian and world championships, participation of Ukrainian athletes on the international arena indicate the need to identify and develop theoretical and practical issues regarding this sport promotion [3, 6].

These issues facing the specialists of aerobic gymnastics concern the already accumulated experience in the literature from such sports as gymnastics, acrobatics, figure skating, synchronized swimming, etc. [8, 9, 13]. But each sport has its own characteristics of building the training process [1, 2, 11, 12 etc]. Aerobic gymnastics is an independent type of gymnastics. It has a very specific system of learning, training and judging [3, 6], but at present the problems of formulating the methodology of aerobic gymnastics have not been confirmed yet. On the one hand the relevance of modeling the annual cycle of training in aerobic gymnastics is determined by the practice demand. On the other hand, it's determined by the lack of scientifically grounded practice of the sports training. The expert research [4, 5, 7, 12,

15 etc] convincingly shows that the effectiveness of the athlete's trainings increasingly depends on the rational planning of training loads in different periods and stages of annual preparation.

Connection of study with scientific programs, plans, topics, programs. The study was conducted in accordance to initiative theme of scientific research done by Department of gymnastics, dancing sports and choreography Kharkov State Academy of Physical Culture: "Theoretical and methodological bases of development of system-forming components of physical culture (sport, fitness and recreation)" for 2020-2025 (state registration number 0120U101215).

Purpose of the study: to develop a year-long cycle model of training for the athletes that specialize in aerobic gymnastics, based on prominent methodology in complex coordination and gymnastic sports considering specifics of given sport.

Material and Methods of research

The study was conducted on the basis of the Kharkov's municipal institution for children's and youth sports school № 13. 24 aerobic gymnasts (12-14 years old) took part in this experiment. The informed consent to participate in this experiment was received from each of the contestants' parents. Two groups of gymnasts were formed (control and basic – 12 people each), judging by the average indicators of physical development, special physical fitness and technical skill of the athletes no significant differences were found. ($p>0,05$).

The pedagogical experiment was carried out in groups of specialized basic training throughout the year. Classes were held 6 times a week lasting 150 minutes. The control group studied according to the training program for Children's and Youth Sports Schools [6]. The main group was introduced the model of the yearlong training cycle included the author's tools, methods and techniques of special exercises which allow purposefully develop physical qualities, increase the level of special physical fitness, train and improve techniques. The model is based on the specifics of motor activity of this sport (performing high-intensity and interval work), sensitive periods of development of physical qualities of athletes 12-14 years, goals and objectives of the stage of the specialized basic training.

To solve the issue there were used such research methods as analysis of scientific and methodical literature and documentary; questionnaire; pedagogical observation (in particular by video recording, analysis and evaluation of results to understand the dynamics of qualitative and quantitative characteristics of competitive activities and individual sportsmanship and training loads of athletes in aerobic gymnastics); pedagogical testing (to correct the tactic and the strategy of trainings); pedagogical experiment; expert estimation (to identify and predict the degree of effectiveness of the results of the study); pedagogical testing and biomedical examinations to determine the level of physical preparation; methods of mathematical statistics (modeling and systematization), using the licensed packages of statistical computer programs such as "EXCEL", "SPSS" and "Statistics" to summarize the results and draw the objective conclusions.

The choice of tests to obtain information about the level of evaluation of special physical and technical fitness was made on the analysis of the dominant motional regime of competitive exercises and the specifics of aerobic gymnastics, age of athletes and the requirements of modern competition rules. It was also based on recent conducted studies in complex coordination sports (sport and rhythmic gymnastics, acrobatic gymnastics, ice skating, etc.) [8, 9, 13]. In this way, there was developed and used a set of control exercises to assess the level of special physical fitness of athletes 12-14 years old. It's substantiated by the authors and meet the requirements of the theory of test standardization and sports metrology [1, 2, 7].

Results of the research

On the basis of the analysis of scientific-methodical literature, video, pedagogical monitoring and experiment we have developed a model of two-cycle training for athletes for ages 12-14 who do gymnastics at the stage of specialized basic training. Its essence consists in distribution of effective methods and in their distribution according to the period of preparation, methods and methodical practices, and volumes of the training load.

The author's model of two-cycle annual training of aerobic gymnastics athletes is aimed at forming a specific functional base for effective training and improvement

of element technique. It’s also presented as a basis for studying the most complex technical elements and combining them into connections.

The content of the two-cycle annual training was formed from various exercises used in the practice of sports training in order to improve the training of athletes, were substantiated and completed author's complexes, training tools for the nature of their bioenergy support:

1) aerobic exercise: individual warm-up exercises; stretching and stretching, choreography (machine), training aerobic connections, improvement of technical elements and their connections;

2) load of aerobic-anaerobic orientation: complexes of circular training, acrobatics, jumps during choreography, training of technical elements in parts, completely and in combination with elements of acrobatics;

3) load of anaerobic-glycolytic orientation: performance of whole and "double" competitive compositions, developed varieties of special exercises. The I complex consists of 10-20 special basic exercises of aerobic gymnastics, duration of performance of one exercise - 10-20 seconds, intervals of rest between series of 40-120 seconds (the general duration of the I complex is 15-30 minutes). Depending on the training period, individual parameters change (pace, number and duration of exercises, series and intervals of rest); II complex consists of 8-15 special basic exercises for aerobic gymnastics, the duration of one exercise to a sharp violation of technique ("to failure"), rest intervals between series of 2-6 minutes (total duration of 30-40 minutes).

The dynamics of indicators of special technical readiness in the process of introduction of experimental model two - cycle annual training is revealed and determined, the actual material of the level of development of special physical training of athletes of the main group (MG) and control group (CG) is presented in table 2.

Table 1

Model of two-cycle annual training of athletes 12-14 years old engaged in aerobic gymnastics at the stage of specialized basic training

	Periods of preparation																								
	Preparatory								Competitive						Transitional				Preparatory						
	Month																								
	September				October				November				December				January				February				
	Week																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	The amount of basic parameters in the weekly microcycle																								
Number training days a week	4	4	4	4	5	5	5	5	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5
Number workouts per day	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	2	1
Training duration (min)	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	120	160	120	160	120	160
***GPT-SPT-TT (%)**	20 – 40 – 20				10 – 30 – 40				10 – 20 – 70						20 – 30 – 30				15 – 30 – 25						
***CH-A-AC (%)**	10 (X) – 10 (A)				5 (X) – 5 (A)				—						10 – 10				15 – 15						
Psychological and tactical training	During the year																								
Educational training camps	During the summer holidays																								
Medical examination	Before the competition																								
Ways to recover athletes	During the year																								

*** Note: GPT** – general physical training; **SPT** – special physical training; **TT** – technical training; **CH** – choreography; **A** – acrobatics; **AC** – author's complexes.

Continuation of the table 1

	Periods of preparation																									
	Competitive									Transitional				Preparatory												
	Month																									
	March				April					May				June				July					August			
	Week																									
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	The amount of basic parameters in the weekly microcycle																									
Number training days a week	4	4	4	4	4	4	4	4	4	3	4	3	4	3	4	3	4	4	5	5	6	6	6	5	5	5	4
Number workouts per day	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Training duration (min)	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	120	120	120	160	160	160	160	160	120	120
***GPT-SPT-TT (%)**	10 – 20 – 70									20 – 25 – 25				20 – 20 – 20				15 – 15 – 20									
***CH-A-AC (%)**	—									15 – 15				20 – 20				25 – 25									
Psychological and tactical training	During the year																									
Educational training camps	During the summer holidays																									
Medical examination	Before the competition																									
Ways to recover athletes	During the year																									

*** Note: GPT** – general physical training; **SPT** – special physical training; **TT** – technical training; **CH** – choreography; **A** – acrobatics; **AC** – author's complexes.

Table 2

Indicators of the level of development of special physical fitness of gymnasts at the stage of specialized basic training before and after the experiment

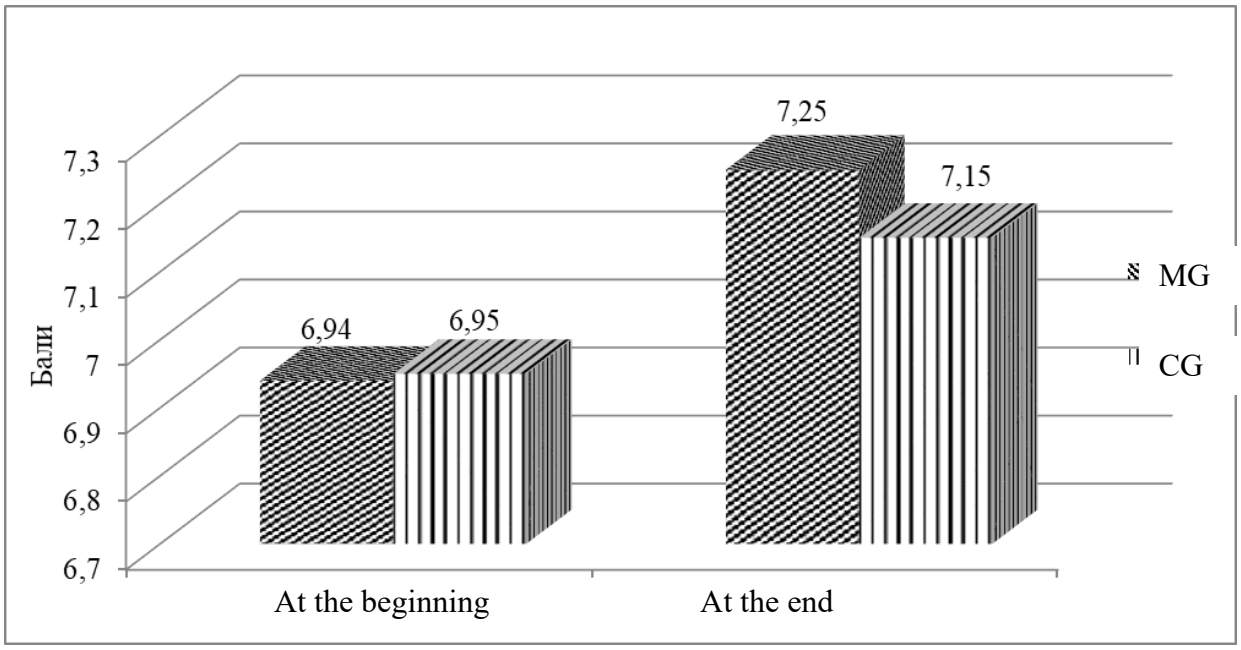
№ n/o	Indexes	Main group (n=12)				Control group (n=12)			
		ID*	FD	%	t; p	ID	FD	%	t; p
		($\overline{X}\pm\sigma$)*	($\overline{X}\pm\sigma$)			($\overline{X}\pm\sigma$)	($\overline{X}\pm\sigma$)		
Coordination skills									
1	Shuttle running 3 x 10 (s) *	10,78±2,5	10,66±2,2	1,01	3,21<0,05	10,65±2,1	10,72±1,9	0,25	3,12<0,05
2	"Flamingo" (s)	87,43±1,5	87,46±1,4	0,04	6,73<0,001	87,25±1,7	87,24±1,6	0,01	1,83<0,05
3	2 forward jumps, jump with 360 ° rotation (points)	8,45±1,9	8,75±1,7	3,55	4,04<0,05	8,0±2,0	8,2±1,8	2,50	3,42>0,05
4	Connection of aerobic tracks (CAT) (points)	8,65±2,2	8,85±2,1	2,50	3,22<0,01	8,30±2,1	8,50±1,9	2,40	1,05>0,05
Strength qualities									
5	Flexion and extension of the arms in the supine position (number of times) *	27,25±1,9	27,67±1,8	2,4	5,03<0,05	22,63±1,9	22,88±1,9	1,9	4,41<0,01
6	Lifting the torso to the side from a supine position (number of times)	32,91±1,7	33,23±1,5	1,39	4,81<0,05	33,05±1,9	33,23±1,7	0,7	4,43<0,01
7	Holding the "chair" position near the wall (seconds)	97,21±1,5	98,02±1,3	1,04	2,44<0,05	95,56±1,5	96,13±1,5	0,75	1,04<0,05
Speed abilities									
8	Running on the spot for 5 seconds (number of times)	28,87±1,5	29,06±1,3	1,00	1,48<0,05	27,76±1,5	27,96±1,2	1,12	1,16<0,05
9	Raising and lowering straight arms from the position of the main rack, hands down for 10 s (number of times)	22,75±1,9	22,83±1,8	0,62	5,71<0,001	22,23±2,0	22,28±1,9	0,40	3,59>0,001
10	10 leans forward from the main stand, hands up the mountain (seconds)	21,93±1,8	22,05±1,7	0,12	2,02>0,05	22,07±2,0	22,15±1,9	0,08	2,81>0,01
Speed and power qualities									
11	Jumping up from a deep squat for 20 s (number of times)	26,18±1,9	26,26±1,7	0,22	5,19<0,05	26,21±1,5	26,22±1,4	0,07	3,22<0,01
12	Alternate leg swings forward for 20 s not lower than 90 ° (number of times)	32,75±1,8	33,05±1,5	1,31	6,43<0,05	33,15±1,5	33,35±1,5	0,90	4,08<0,001
Flexibility									
13	Bridge (points)	8,98±0,7	9,0±0,5	1,0	3,46<0,01	9,05±0,5	9,13±0,5	0,88	3,11>0,01
14	Twine on the right leg (points)	9,76±0,9	9,96±0,8	2,0	3,59<0,01	9,82±0,7	9,86±0,6	0,4	1,09<0,05
	Twine on the left leg (points)	9,98±0,4	10,00±0,3	0,2	5,51<0,001	9,83±0,5	9,85±0,3	0,2	4,63<0,001
	The twine is transverse (points)	10,00±0,2	10,00±0,2	0,00	6,24>0,001	10±0,2	10±0,2	0,00	5,15<0,001
Functionalities									
15	GSTI (%)*	79,32±1,5	80,43±1,2	1,39	5,7<0,001	78,55±1,7	79,39±1,5	1,08	4,2<0,001

***** ***Note:*** **ID** - initial data (at the beginning of the experiment); **FD** - final data (after the experiment); **GSTI** - Harvard step test index.

Comparison of the dynamics of the results of the two groups indicates an improvement in all indicators of preparedness. The average score by type of training is increasing.

Analysis of the results of technical readiness tests suggests that due to the use of experimental author's model of two-cycle annual training, athletes have reached a higher level in the performance of technical elements of aerobic gymnastics.

Figure 1 shows the changes in the integrated indicator of technical readiness in both groups: MG – 11,5% and CG – 8,8%. It should be noted a significant ($p>0,05$) improvement in the results of technical training of athletes in the main group.



Note: **SPF** - special physical fitness; **TR** - technical readiness; **MG** - main group; **CG** - control group.

Fig. 1. Dynamics of indicators of technical readiness of athletes of the main and control groups

The proposed model of the annual training cycle of athletes 12-14 years old, engaged in aerobic gymnastics at the stage of specialized basic training, leads to the development of individual physical qualities, increasing the level of special training and gaining stability and quality of technical elements of competitive programs.

The training process, which took place according to the proposed model, made it possible to improve the results of athletes' performances at competitions, which

allows us to consider this planning of training work in the annual cycle rational. The training allowed all 12 members of the team - athletes of the experimental group, to meet the standard of a candidate for master of sports of Ukraine in aerobic gymnastics.

Conclusions / Discussion

The results of the study confirm the existing opinion that the problem of improving the training process does not lose relevance [4, 5]. The authors of the works argued the planning of the training process in the annual macrocycle. In our study, the specifics of the training process in aerobic gymnastics as a sport were studied for the first time. Effective means, methods, methodical receptions are revealed and practically substantiated and the size of training loadings is defined. The level of development of physical qualities, special physical training and technical skill of athletes is determined and established. It is experimentally proved and mathematically confirmed that the developed model of the annual training cycle is the most effective for determining the readiness for competitive activities of athletes 12-14 years' old who are engaged in aerobic gymnastics at the stage of specialized basic training.

In the future, further research provides for the development of theoretical and methodological foundations for the construction, improvement and correction of annual training programs for qualified athletes in aerobic gymnastics.

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Information about the Authors

Valentyna Todorova: Doctor of Physical Education and Sport, associate professor; The State institution «South Ukrainian National Pedagogical University named after K. D. Ushynsky»: st. Staroportofrankovskaya, 26, Odessa, Ukraine.
ORCID: https://orcid.org/0000-0002-3240-6983
E-mail: Valentina_sport@ukr.net

Inna Bodrenkova: PhD (Physical education and Sport), Associate Professor; Yaroslav Mudryi National Law University: 61024, Ukraine, Kharkiv, Pushkinskaya str., 77.
ORCID: https://orcid.org/0000-0002-3454-1118
E-mail: Innasport2009@gmail.com

Tetiana Moshenska: Kharkiv state Academy of Physikal Cuiture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.
ORCID: https://orcid.org/0000-0002-0771-5717
E-mail: tvmoshenska@gmail.com