

Improvement of special physical training of female gymnasts in sports aerobics at the stage of preliminary basic training

Galyna Artemyeva
Tetiana Moshenska

Kharkiv State Academy of Physical Culture, Kharkiv, Ukraine

Purpose: to investigate the influence of the proposed methodology on the indicators of special physical preparedness of female gymnasts in sports aerobics at the stage of preliminary basic training.

Material & Methods: in the study took part girls 7–9 years in the number of 20 athletes 1st and 2nd junior category in sports aerobics. The control group consisted of 10 people and the experimental group consisted of 10 people. To conduct our research, we used the following methods: analysis of scientific and methodological literature, pedagogical observations, pedagogical testing, pedagogical experiment, method of peer review, methods of mathematical statistics.

Results: as a result of the study, a positive effect of the means of gymnastic exercises without a subject and with the subject on the indices of special physical preparedness of female gymnasts in sports aerobics at the stage of preliminary basic training.

Conclusion: five out of six indicators of special physical readiness have been significantly changed at a given reliability 95%.

Keywords: sports aerobics, special physical training.

Introduction

Sports aerobics are a complex co-ordinated sport, in which the execution of aerobic exercises is combined with a rhythmic pattern of musical accompaniment [1]. Competition program consists of high-intensity acyclic exercise complexes that combine the complex coordination movements of the arms and legs, strength exercises, flexibility and acrobatic elements of varying complexity [8]. The basis for the choreography of competitive compositions is the traditional "basic" aerobic steps and their varieties [2].

Process of improving the technique of exercise in sports aerobics is complex and time-consuming. It requires a rational methodical approach, knowledge of the technique of movements and the laws of its formation [3; 7]. Basis of the technique of performing exercises is developed to optimal parameters leading physical qualities [5; 9]. Solution of this issue becomes possible in the process of special physical training.

The problem of improving the process of special physical training is devoted to a large number of fundamental researches in sports. Specialists in the field of sports aerobics also pay attention to this issue; however the studies are fragmentary, does not give a clear idea of the process of special physical training during the long-term sports improvement and its organization and maintenance at the stage of preliminary basic training [4; 6]. At this stage of training, the number of aerobic exercises dramatically increases, which must be learned by athletes. Therefore, the search and combination of rational means for the successful training of gymnasts is topical.

Relationship of research with scientific programs, plans, themes. The work was carried out in accordance with the Consolidated Plan of research works in the field of physical culture and sports for 2011–2015. On the topic 2.6 "Theoretical and methodological basis for improving the

training process and competitive activities in the structure of long-term training of athletes" (state registration number 0111U001168).

The purpose of the research: to investigate the influence of the proposed methodology on the indicators of special physical preparedness of female gymnasts in sports aerobics at the stage of preliminary basic training.

Objectives of the study:

1. Conduct an analysis of the process of special physical training of athletes in sports aerobics at the stage of preliminary basic training.
2. Determine the level of special physical preparedness and psychomotor abilities of athletes in sports aerobics at the stage of preliminary basic training.
3. To study changes in the indices of special physical preparedness and psychomotor abilities of athletes in sports aerobics at the stage of preliminary basic training.

Material and Methods of the research

The study was carried out on the basis of the Comprehensive children's and youth sports school No. 13 and the research laboratory of the KSAPC. The study involved girls 7–9 years in the number of 20 athletes who have 1 and 2 youth categories in sports aerobics. In the control and experimental group were distributed to 10 female athletes, who were selected for homogeneity of characteristics during the initial testing. To conduct our research, we used the following methods: analysis of scientific and methodological literature, pedagogical observations, pedagogical testing, pedagogical experiment, method of peer review, methods of mathematical statistics.

Results of the research and their discussion

The analysis of scientific and methodological literature was carried out with the purpose of generalization, the main factors and conditions for raising the level of special physical preparedness of female gymnasts.

In sports aerobics, starting from the junior school age, children perform competitive exercises in accordance with international FIG rules. Young athletes take part in the following nominations: individual performances, mixed pairs, threes and groups.

One of the main criteria for the successful performance of exercises in sports aerobics is the demonstration of a balance between the combination of aerobic tracks, elements of complexity from groups A, B, C and D and elements of acrobatics. They are performed at a sufficiently high rate and should coincide with the rhythmic structure of the musical accompaniment. The duration of the competition program for children 1 minute 10 ± 5 seconds. According to the rules of the competition for each age category there are mandatory elements that must be demonstrated by athletes in the performance of a competitive program.

Therefore, in this work, to determine the level of special physical preparedness, test exercises were selected, when drawing up of which attention was paid to these elements (Table 1). The method of peer review was introduced for independent evaluation and unbiased attitude to the performance of tests by athletes. For the assessment in the test exercises, the principle of the evaluation of competitive programs was laid; the maximum score that the participant of the research could receive from experts is 8 points.

Based on the data presented in Table 1, we can say that the

qualitative indicators of the results of the athletes CG and EG correspond to the "average".

Coefficients of variation in the results of testing the CG and EG of athletes range from 13% to 25%, indicating an average degree of homogeneity of the characteristics.

Given that in sports aerobics, all movements of competitive programs have a complex coordination structure, training must take into account aspects of managing these movements. Since it is impossible to control motor activity and to correct it without the systems of perception and processing of information, we also measured the parameters of sensory and nervous systems (Table 2).

When comparing the test results with the standards, it can be stated that the quality indicators: in KG and EG in the three tests have a "low level" rating, in the test "Determination of the time of simple sensorimotor reaction to light by hand", the evaluation is the "average level". Coefficients of variation range from 13% to 21%, indicating an average degree of homogeneity.

Based on the findings, in accordance with the physical capabilities of girls 7–9 years old [7] and according to the principles of physical education and sports [3; 9], a methodology was developed. The essence of this technique is to improve the means of developing the leading physical qualities: coordination, speed and strength, flexibility and the creation of the necessary technical base to ensure the reliability of the performance of competitive compositions. This technique also included the inclusion of elements of acrobatic training. The main means on which we focused attention were: exercises on the reaction rate; exercises for coordinating the movements of various parts of the body exercises on the development of flexibility exercises with objects (skipping rope, gym-

Table 1
Indicators of special physical fitness of female athletes in aerobic athletics at the beginning of the study at the CG and EG

No. i/o	Test	Result of CG (n=10) $\bar{X} \pm \sigma$	CV, %	Result of EG (n=10) $\bar{X} \pm \sigma$	V, %
1.	Jump with 360° turn (points)	4,35±0,86 [*]	17	4,53±0,79	19
2.	Jump in the grouping (points)	4,44±0,95 [*]	19	4,51±0,96	16
3.	Turn with a leg on the pass on 360° with the final position in the vertical twine (points)	4,65±1,03 [*]	21	4,62±1,02	25
4.	From the longitudinal twine, turn to the side by 360° (points)	4,69±0,91 [*]	14	4,79±0,94	18
5.	Aerobic track (points)	4,91±0,92 [*]	14	4,62±0,89	15
6.	Acrobatic track (points)	4,01±0,89 [*]	15	4,73±0,86	13

Remark. * – between the parameters of CG and EG there is no significant difference in $p > 0,05$.

Table 2
Parameters of the psychomotor abilities of female athletes in sports aerobics in CG and EG at the beginning of the study

No. i/o	Test	Result of CG (n=10) $\bar{X} \pm \sigma$	CV, %	Result of EG (n=10) $\bar{X} \pm \sigma$	V, %
1.	Determination of the time of a simple sensorimotor reaction to light by hand (mls)	294,6±34,31	12	296,52±36,13	14
2.	Determination of the time of a simple sensorimotor reaction to the sound signal by hand (mls)	277,8±40,72	16	281,11±42,21	13
3.	Determination of the duration of an individual minute (s)	75,67±15,87	21	73,84±14,26	18
4.	Tapping test hand (s)	72,9±11,17	14	70,26±10,62	13

nastic ball) varieties of jumping acrobatic and semi-acrobatic exercises.

During the duration of the study, the training sessions conducted pedagogical observation of the accuracy and speed of mastering the exercises and retaining the skills in time, as well as the body's response to the proposed load. The developed technique was applied at each lesson in the EG female athletes.

At the end of the experiment, we re-tested the special physical preparedness and made a comparative analysis between the indices of athletes CG and EG, which is reflected in Table 3.

As the data of Table 3 show, there is a positive dynamics of changes in the investigated indicators of special physical readiness, both in the CG and in the EG, but thanks to the introduction of the methodology, the EG indicators changed more significantly.

Throughout the study, qualitative assessments of the athletes' performance have changed: in CG in all tests – the level "above average", in the EG in all tests – the level of "high".

A comparison with Student's t-test determined the reliability of the differences in all indicators for $p < 0,05$.

At the end of the study, we also conducted repeated testing of the athlete's functional systems (Table 4).

On the parameters of repeated testing, the athletes of both groups improved their results. In the CG female athletes in three tests, characterizing the visual, auditory system and sense of time, the quality indicator remained at the initial level. In EG female athlete in test "Determination of the time of a simple sensorimotor reaction to light by hand" evalu-

ation – "average level", in test "Determination of the time of a simple sensorimotor reaction to the sound signal by hand" and "Determination of the duration of an individual minute" – "high level", in test "Tapping test hand" – group was highly appreciated, but in the EG, the average performance improved more significantly. After the comparison of the indices in the Student's t-test, reliable changes were established for all indicators at $p < 0,05$.

Conclusions

1. To date, sports aerobics on the path of its development and requires the development of the foundations of the organization of the training process. Particularly acute is the question of organizing the process of special physical training at the stage of preliminary basic training, since properly developed leading physical qualities create the foundation for mastering the technique of this sport.

2. According to the expert assessment, at the beginning of the study the results of the indices of the special physical preparedness of the athletes EG and CG are at an average level. The coefficients of variations in the results obtained in the CG and EG of athletes range from 13% to 25%, indicating an average degree of homogeneity of the characteristics.

3. Qualitative indicators of the psychomotor abilities of the athletes CG and EG group at the beginning of the study in the three tests have a "low level" rating, in the test "Determination of the time of simple sensorimotor reaction to light by hand", the assessment is the "average level". The coefficients of variation range from CV 13% to 21%, indicating an average degree of homogeneity.

4. Sport gymnast's lessons in sports aerobics for 6 months allowed to improve the performance of special physical readi-

Table 3
Comparative analysis of special physical readiness of female athletes in sports aerobics CG and EG after the experiment

No. i/o	Test	Result of CG (n=10)		Result of EG (n=10)		t	P
		\bar{X}	$\pm\sigma$	\bar{X}	$\pm\sigma$		
1.	Jump with 360° turn (points)	5,28	0,58	7,55	0,35	-2,35	<0,05
2.	Jump in the grouping (points)	5,22	0,68	7,44	0,26	-2,29	<0,05
3.	Turn with a leg on the pass on 360° with the final position in the vertical twine (points)	5,51	0,45	7,56	0,36	-2,28	<0,05
4.	From the longitudinal twine, turn to the side by 360° (points)	5,27	0,42	7,28	0,33	-2,32	<0,05
5.	Aerobic track (points)	5,25	0,48	7,28	0,29	-2,31	<0,05
6.	Acrobatic track (points)	5,35	0,49	7,54	0,31	-2,45	<0,05

Table 4
Comparative analysis of indicators of functional readiness of female athletes in sports aerobics of CG and EG after the experiment

No. i/o	Test	Result of CG (n=10)		Result of EG (n=10)		t	P
		\bar{X}	$\pm\sigma$	\bar{X}	$\pm\sigma$		
1.	Determination of the time of a simple sensorimotor reaction to light by hand (mls)	289,72	31,82	277,43	33,84	2,57	<0,05
2.	Determination of the time of a simple sensorimotor reaction to the sound signal by hand (mls)	274,68	38,58	263,22	35,32	2,53	<0,05
3.	Determination of the duration of an individual minute (s)	70,54	13,56	64,82	12,45	2,34	<0,05
4.	Tapping test hand (s)	74,17	10,81	79,11	9,13	-2,16	<0,05

ness of athletes CG and EG. During the term of the study, the qualitative parameters of the CG athletes changed, which were trained according to the existing program, in all tests – above the average level, in which the exercises were conducted according to the experimental method, in all tests – a high level.

5. A comparison with Student's t-test determined the reliability of differences in all indicators of special physical fitness and psychomotor abilities at $p < 0,05$. With the help of this test, we

determined the properties of the children's nervous system, help us correctly form pairs, troikas and group performances, and the results of these tests will be an indispensable criterion when staging demonstrations and competitive programs.

Prospects for further research. In the future, it is planned to correct the methodology of special physical preparation for its introduction into the training process of female athletes in sports aerobics at the stage of specialized basic training.

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References

1. Artemieva, G.P., Druz, V.A. & Lysenko, A.A. (2015), "Community development principles for assessing the qualitative characteristics of motor activity in fitness aerobics and aesthetic sports", *Slobozans'kij naukovno-sportivnij visnik*, No. 6(50), pp. 20-24, doi: 10.15391/sns.v.2015-6.002. (in Russ.)
2. Miakinchenko, E.B. & Shestakova, M.P. (2002), *Aerobika [Aerobics]*, SportAkademPress, Moscow (in Russ.)
3. Boliak, A.A. & Boliak, N.N. (2009), "Simulation of sportsmen's technical fitness in aerobic gymnastic", *Slobozans'kij naukovno-sportivnij visnik*, No. 2, pp. 119-123. (in Ukr.)
4. Boliak, A.A. (2002), "New approaches to the process of special physical training in sports aerobics", *Slobozans'kij naukovno-sportivnij visnik*, No. 5, pp. 97-101. (in Russ.)
5. Zaciorskij, V.M. (2009), *Fizicheskie kachestva sportsmena [Physical qualities of sportsman]*, Moscow. (in Russ.)
6. Levchuk, L. (2004), "Formation of the methodology of sports aerobics", *Moloda sportyvna nauka Ukrainy*, Vol. 8, pp. 244-247. (in Ukr.)
7. Moshenskaya, T.V. (2013), "Compatibility athletes in the formation of sport aerobics team based on their technical and special physical preparedness", *Slobozans'kij naukovno-sportivnij visnik*, No. 5, pp. 52-55. (in Russ.)
8. Moshenskaya, T.V. & Bodrenkova, I.A. (2015), "Special speed-strength training as a basis for improving technical skills in aerobic sports", *Pedagogika, psihologija medyko-biologichni problem fisychnogo vyhovannia i sportu*, No. 15, pp. 67-73. (in Russ.)
9. Sergiienko, L.P. (2004), "Formation of motor skills at the initial stage of training in aerobics and rhythmic gymnastics", *Moloda sportyvna nauka Ukrainy*, Vol. 8, pp. 342-344. (in Ukr.)

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Information about the Authors

Galyna Artemyeva: PhD (Physical Education and Sport), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0003-3121-2754

E-mail: galina9767@gmail.com

Tetiana Moshenska: Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.

ORCID.ORG/0000-0002-0771-5717

E-mail: tvmoshenska@gmail.com