

**FEATURES OF METHODOLOGY OF FLEXIBILITY DEVELOPMENT OF
FEMALE ATHLETES OF 8-9 YEARS OLD, ENGAGED IN ARTISTIC
GYMNASTICS**

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Purpose: to substantiate the effectiveness of the use of author's methodology of flexibility development of 8-9 years old athletes, engaged in artistic gymnastics.

Material and methods: the research was carried out during the year with a group of athletes (12 female gymnasts) engaged in gymnastics at the Sports School of high sportsmanship in Kharkov. The pedagogical experiment was organized with the aim of improving the content of the educational and training process in artistic gymnastics. The methodology developed in the course of the research consisted of appropriately selected means and methods aimed at ensuring a gradual and systematic increase in the level of flexibility development among young female gymnasts. After the initial testing of the level of flexibility development in the training process of the female gymnasts of the research group, a specially developed author's methodology was additionally included, which was used in the main part of the training session (10-12 minutes). To identify the effectiveness of the author's methodology, analysis and generalization of literary sources, pedagogical observation, testing, pedagogical experiment, methods of mathematical statistics were used.

Results: according to the results of the experiment, an improvement was revealed in almost all the studied indicators, namely, the results of the split on the left leg (45%) and gymnastic exercises in cities (20%) significantly improved.

Conclusions: the obtained results of the study showed the effectiveness of using the proposed methodology of flexibility development of female gymnasts of 8-9 years old (the difference between the average group results shown by female gymnasts in most of the test tasks is statistically significant).

Keywords: flexibility development, gymnastics, 8-9 years old female gymnasts, testing.

Introduction

It is well known that the effectiveness of the training process in gymnastics depends on the means and methods used in training sessions with athletes [2, 5, 10, 13; 14]. Artistic gymnastics as a sport, by the nature of motor activity, refers to the complex coordination and requires athletes to display a wide range of motor skills, skills and qualities that require an appropriate level of physical fitness and constant correction of the training process [16].

According to foreign and domestic experts [2, 4, 9; 10, 13], the technical training of gymnasts should be carried out on the basis of the advanced development of special physical qualities, that is, the advanced development of the physical qualities of gymnasts should be ensured in relation to their technical training.

It should be noted that in the preparation of athletes in artistic gymnastics flexibility is a key quality underlying the system of long-term improvement of gymnastic all-around exercises [17; 19]. All fundamental groups of elements (jumps, balances, turns, inclinations) are performed with maximum amplitude, often exceeds the physiological norm of joint mobility [3; 6; 9; 15; 18].

Despite the fact that all the complex and technical elements in artistic gymnastics are based on a high level of flexibility, increasing its development in young athletes is an integral part of the training process, and therefore an urgent research task for scientific analysis.

Purpose of the research: to substantiate the effectiveness of the use of the author's methodology for the development of flexibility of female athletes of 8-9 years old engaged in artistic gymnastics.

Material and Methods of the research

The pedagogical experiment, in which 12 female athletes aged 8-9 years took part, was organized with the aim of improving the content of the educational and training process in artistic gymnastics.

The methodology developed in the course of the research consisted of appropriately selected means and methods aimed at ensuring a gradual and systematic increase in the level of flexibility development among young gymnasts. After the initial testing of the level of flexibility development in the training process of the female gymnasts of the research group, a specially developed author's methodology was additionally included, which was used in the main part of the training session (10-12 minutes).

This technique involved the use of means and methods that allowed performing exercises, with the prevention of strong pain sensations, in particular, the technique of stretching, stretching at a minimum speed, with muscle relaxation at the maximum point of amplitude, etc. (table 1).

Table 1

Basic set of exercises for the development of flexibility of female gymnasts 8-9 years old

№ i/o	Content of the exercise	Methods and techniques	Dosage	Organizational and methodical instructions
1.	P.p. - a narrow stand of the legs apart, hands up into the lock, palms out. A) taking hands back to each count. B) also in p.p. kneeling and sitting. C) also with the help of a partner in p.p. kneeling and sitting.	G-2; G-4 (1); G-5(3)	8-10 times	Observe the symmetrical position of the hands. The head is raised, passive abduction is performed gently, without spring movements
2.	P.p.. - narrow kneeling position, hands up. 1-3 - tilt back to half- bridge stretch; 4 - p. p.	G- 2	6-8 times	Perform the exercise at a slow pace, without spring movements, with the help of a partner.

Continuation of Table 1

3.	P.p. - lying on your stomach, hands grab the ankle joints of the legs bent back. 1-7 - bend over, straightening your legs ("basket"); 8 - p.p.	G- 4(1, 3); G-5 (2)	6-8 times	Observe a symmetrical body position
4.	P.p. – twine, right on the dais; 1-4 - tilt back; 5-8 - p.p. Same as left	G- 4(3)	6-8 times	Monitor the symmetrical position of the body, relax muscles in case of pain
5.	P.p. – gymnast No. 1 in a stand with her back to the gymnastic wall in a split; gymnast №2 partner pulls the leg back down, then let go; №1 holds position.	G-2; G-4 (2)	6-8 times for each leg	Observe a symmetrical body position. During forced stretching, try to relax the muscles, do not resist
6.	P.p. – main stand, jump rope four times folded down; 1-2 - moving the rope back; 3-4 - also forward.	G- 4(2)	12-16 times	The work of both hands should be simultaneous. Gradually reduce the distance between the arms
7.	P.p. – sead, hands up. A) Slopes for each account. B) Bends with a grip on the ankle joints. C) Elastic slopes. D) Slopes with the help of a partner.	G-2; G-4 (3)	10-12 times	Observe a symmetrical body position. Relax the muscles at the extreme point of amplitude. The amplitude of the movement is maximum.
8.	Swing your legs forward, backward, right, left, inward, outward. A) The same in p.p. sitting, lying on your back. B) Swing back to p.p. lying on your stomach. C) Swing right, left, pulling the leg and holding this position for 5-10 s at the highest point in p.p. sitting, lying on your back.	G-1; G- 3; G-4 (1,2,3); G-6(1)	8-12 times for each leg	Observe a symmetrical body position. Swing to perform with the maximum possible amplitude
9.	P.p. – a female gymnast in a stand with her back to the gymnastic wall in a split with the right, gripping the rail with her hands; performs swings with the left leg back and down in the "ring". The same thing, but on a different foot	G-1; G- 3; G-5(1,2); G-6(2)	10-12 times right, left	Weights and a shock absorber can be used to complicate the exercise.
10.	Twine right, left, straight up	G-4(1)	90-100 s	Monitor breathing, relax muscles at the extreme point of amplitude.

The following abbreviations were used in the table:

G-1 - *a method of joint development of strength and flexibility*, it allowed simultaneously to combine the development of strength and flexibility in the process of performing exercises.

G-2 - *a method of pre-tensioning muscles with their subsequent stretching*, which allowed the ability of muscles to stretch more efficiently after pre-tensioning them.

G-3 - *a ballistic method* that allowed the execution of fast movements with a gradual increase in amplitude.

G-4 - *the method of static stretching, allowed stretching the muscles until the moment when further movements are limited by their own tension. Methodological techniques:* muscle stretching followed by their isometric tension G 4 (1); passive stretching of muscles with an active content of the limiting position G 4 (2); active stretching of muscles with passive stretching G 4 (3).

G-5 - *method of mixed stretching*, provides for the use of all of the above methodological techniques in various combinations. *Methodical techniques:* performing an exercise with a minimum speed and maximum amplitude and with muscle relaxation at the maximum point of the amplitude G 5 (1); performing an exercise with a minimum speed and maximum amplitude using the weight of one's own body or its parts G 5 (2) performing an exercise with a minimum speed and maximum amplitude using additional forces G- 5(3).

G-6 - *method of dynamic stretching*, was implemented by repeated repetition of movements with a gradual increase in their amplitude, and was based on the ability of muscles to stretch much more when performing the exercise again. *Methodical techniques:* ballistic stretching with a gradual increase in amplitude G 6 (1) performing an exercise with a maximum amplitude and using the weight of one's own body or its parts at a fast pace G 6 (2) performing an exercise with a maximum amplitude at a slow pace G 6 (3) [1; 6; 8].

Results of the research

To check the effectiveness of the developed methodology, a comparative analysis of changes in the level of flexibility development of female gymnasts of 8-9 years old was carried out during the study period (Table 2).

Table 2

Comparative analysis of changes in the level of flexibility development among female gymnasts 8-9 years old during the study period (n=12), ($t_{gr} = 2,07$ at $p < 0,05$)

№ i/o	Test	$\bar{X} \pm m$		t_p	P	Increase in res-in, %
		Initial results	Repeated results			
1.	"Bend forward from a sitting position, legs apart, arms up" (degrees)	49,0±2,27	43,0±2,08	1,76	>0,05	12%
2.	"Gymnastic bridge" (points)	5,0±0,19	6,0±0,25	2,37	<0,05	20%
3.	"Twisting the stick" (cm)	39,0±1,85	35,0±1,72	1,49	>0,05	10%
4.	"Performing a twine on the right leg" (cm)	9,0±0,21	8,0±0,20	2,79	<0,05	11%
5.	"Performing a twine on the left leg" (cm)	9,0±0,25	13,1±0,19	2,62	<0,05	45%
6.	"Performing a transverse twine" (cm)	45,0±1,08	41,3±1,08	2,47	<0,05	8%

As can be seen from the presented materials in the test "Bend forward from the sitting position, legs apart, arms up", which was used to determine the mobility in the knee joint, the athletes showed an average group result at the beginning of the study 49,0±2,27 degrees, and at the end – 43,0±2,08 degrees. The difference between these indicators is not statistically significant, since $t_p = 1,76 < t_{gr} = 2,07$. The improvement in the result in performing this test is 12% (Table 2).

When performing the next test exercise "Gymnastic bridge", which characterizes the development of mobility in the spine, the athletes at the beginning of the study showed an average group result of 5,0±0,19 points, at the end – 6,0±0,25 points. Comparison of these results by Student's test shows that the difference

between the group mean values is statistically significant $t_p=2,37 > t_{gr}=2,07$. This means that the results obtained at the end of the study have objectively improved in relation to the baseline results. Their growth is 20%.

The results of the study also indicate that when performing the "Twisting the stick" test, the athletes showed an average group initial result – $39,0 \pm 1,85$ cm, and an average group repeated result – $35,0 \pm 1,72$ cm (Table 2). The difference between these indicators is statistically insignificant. ($p > 0,05$).

The obtained indicators characterizing the level of flexibility development indicate an improvement in results during the study by 10%. Determination of the development of flexibility in the hip joints was carried out using tests: "Twine on the right leg", "Twine on the left leg", "Transverse twine".

When performing a twine on the right leg, female gymnasts of 8-9 years old showed an average group result of $9,0 \pm 0,21$ cm at the beginning of the study and $8,0 \pm 0,20$ cm at the end. Since $t_p=2,79 > t_{gr}=2,07$, it can be concluded that the difference between these indicators is statistically significant.

When performing a twine on the left leg, the athletes showed an average group result of $9,0 \pm 0,25$ cm at the beginning of the study and $13,1 \pm 0,19$ cm at the end. The difference between these results is statistically significant because $t_p > t_{gr}$.

The results obtained by the young gymnasts of the "Transverse twine" test ($45,0 \pm 1,08$ cm at the beginning of the study and $41,3 \pm 1,08$ cm at the end) indicate that the difference between the average results is statistically significant ($p < 0,05$). It should be noted that the results shown by gymnasts 8-9 years old in tests for determining the mobility in the hip joints allow us to state the effectiveness of using the developed method of exercises aimed at developing flexibility: the improvement in the result on the right leg is 11%, on the left leg 45% and transverse 8% (Table 2).

Conclusions / Discussion

The results of the research carried out supplement the theoretical provisions formulated in the works of V.M. Kostyukevich [7], V.M. Platonov [10], V.A. Sutuloy, A.Kh. Deineko, A.V. Ryabchenko [12] that the effectiveness of the training process is directly dependent on the means and methods that are used in training

sessions with athletes. However, the constant correction of the training process for the development of flexibility remains relevant today, since all the complex technical elements in artistic gymnastics are based on its high level. Therefore, underestimating the development of flexibility is a gross mistake that hinders the process of improving not only the physical, but also the technical skill of female gymnasts.

The results of the entire complex of the research carried out supplement the data of scientific works [2, 3, 6; 9] on the use of various means and methods of flexibility development in the training process of young female gymnasts.

The study also confirms the conclusions of V. Lenishin [8], L. Manko [9], V. Sutula, A. Deineko [11], A. Khudoliy [13] and other scientists that physical exercises are the main means of improving flexibility that require a greater range of motion in the joints than in everyday life, professional and sports activities. These elementary exercises from basic gymnastics, acting on certain groups of muscles and ligaments, which gradually increase the range of motion to the border possible at this stage.

Thus, the results of the study showed the effectiveness of using the proposed methodology for the development of flexibility of female gymnasts of 8-9 years old (the difference between the average group results shown by female gymnasts in most of the test tasks is statistically significant).

Prospects for further research consist in the introduction of the developed author's methodology for the development of flexibility of gymnasts of 8-9 years old in the educational process of the children's and youth sports school, clubs and specialized educational institutions for its further improvement.

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