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TECHNICAL PROPERTIES INCREASING EFFICIENCY ELEMENT "GIANT CIRCLE BACKWARD" AT JUNIOR GYMNASTS

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Abstract
The Romanian gymnastic school is impressive. Medals in major international competitions were often monopolized by Romanian gymnasts who provoked the audience enthusiasm and admiration. An analysis of past Olympic Games and World Championships shows that the event with the less expectations has been uneven bars.
This paper is generated by practical work started on two groups of IVth category gymnasts from Farul Constanta Sports Club.
Hypothesis
The uneven bars exercises performed in easier conditions with the help of an installation conceived by us will lead to a correct technique and to the improvement of the execution technique.
Purpose

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This research aims to improve the execution technique and to apply drills which can ease the learning of the technical element – Giant circle bwd.
Methods
The research has been developed as an experiment on two groups of gymnasts: the experimental group consisting of eight gymnasts with an average age of 8.6 ± 0.765 years, and the control group made up of eight gymnasts with an average age of 8.8 ± 0.954
The experiment was conducted over a period of six months (October 2010- March 2011), 25 weeks, 450 hours, from which 70 hours were allocated for the experiment.
The established drills were performed on a thinner bar covered by a tube which slides on the first bar. The applied tests were for physical training (4) and for technical training (2).
Discussions
The data analysis reveals the efficiency of the applied drills, so the experimental group recorded superior results than the control group. The difference between the means on physical training tests is not statistically significant. On technical tests, the experimental group registers significant differences at final testing ($p < 0,05$).
Conclusions
Hypothesis has been confirmed. The drills which were performed on the built equipment were efficient, so the experimental group has progressed to the control group.
Key words: gymnasts junior technical properties increasing

Introduction

To set the features of the training lesson with IVth category gymnasts, it is necessary to take into account features of 8-10 years old girls in their growing up and development. Practice and results obtained in working with small school-age gymnasts, as well as the numerous research have shown that gymnasts are as able as adults to make incredible efforts to achieve high performance, with the specification not to ignore the growth rate of the body in its various stages of development. If the volume and intensity of effort are exaggerated, the training is unilateral, and recovery after exercise is insufficient.

Training at the age of 8-10 years old should be aimed at developing neuro-muscular coordination, without pursuing by all means the increase of aerobic and anaerobic power. So it is advisable to insist on technique and precision movements (E. Avramoff, 1982).

The learning of movements by gymnasts should be done by taking into account a series of rules: in their preparation, the emphasis is on developing physical and moral qualities, adopting a correct, aesthetic and expressive posture, but also on the accuracy of technical and artistic elements. The fundamental positions for each contest apparatus must be learnt properly, starting from the most simple and accessible at this age. The learning of positions to apparatus is straightforward, difficulties can only occur in the correct assessment of body position in space, especially in inverted positions (P. Dungaciu, 1982).

In gymnastics, one cannot speak of a single motric or mental capacity necessary to obtain superior results, but of a mixture of psycho-motric qualities. At

the same time it should be noted that some qualities are prevailing. Motric qualities must be developed continuously so as to meet the requirements of the IVth category. Only on the basis of appropriate physical and motric qualities can the wide variety of technical and artistic elements be achieved in women's gymnastics (Gh. Baiesu, 1972).

The development of motric qualities at this age is very necessary mainly to strengthen health and to have a good posture especially as gymnastics cultivates the aesthetic qualities of movements to each apparatus, mainly on the ground and beam (M. Solomon, 1996).

The basic motric qualities are strength, skill, speed (especially that of reaction), joint mobility and special resistance. Of combined motric qualities, the ones which need to be developed in training the IVth category gymnasts are as follows: under the speed force (explosive force), speed under power (expansion), under the speed skill and mobility (I. Tudusciuc, 1984).

Strength is a factor which influences positively the safe performance of the drills on each device.

The training of the IVth category gymnasts falls on the scapular-humeral and arms areas (M. Frum, 1993). During training, structures of exercises close to specific movements should be used, strength increasing during motric skills, performed correctly from a technical point of view (A. Stroescu, 1968).

From the methods of force development, the most used is the method of circuit work.

The functional capacity of vegetative organs is characterized by a larger area of the lung than at adult's, an increased amount of blood passing through the lungs, an increased respiratory capacity, a higher minute-volume of the heart during exercise than at rest, a high degree of elasticity of blood vessels (I. Hidi, 1991).

Material and method

Research includes an experiment for checking and testing some operational models to improve and strengthen giant circle bwd to uneven bars.

The experiment was performed on the IVth category gymnasts from Farul Constanta Sports Club.

Groups are training in the room at „TOMIS" Sports Complex, under the coordination of the coaches Olga Didilescu for the experimental group and Nicolae Forminte for the control group.

The experimental group comprises eight gymnasts with an average age of 8.6 ± 0.765 at initial testing and practise gymnastics for 2.7 ± 0.548 years.

The control group comprises eight gymnasts with an average age of 8.8 ± 0.954 at initial testing and practise gymnastics for 2.4 ± 0.839 years.

Research protocol

The experiment was conducted over a period of 6 months (October 2010 - March 2011), with 25 working weeks, excepting days off, holidays or rest days. Out of 450 hours, the experiment was alloted 30 minutes a day in the first half and 25 minutes in the second half, thus amounting to a total of 70 hours.

The duration of the experiment comprised the stages of the preparatory (15 weeks) and pre-competitive (10 weeks) period. Firstly, we conducted a 30-minute experiment totalling 45 hours, and during the pre-competitive period we reduced it to 25 minutes totalling 25 hours from a total of 70 hours.

To improve giant circle bwd we worked throughout the experiment under the same conditions in the room, temperature and at the same hour.

Tests carried out on both the control group and the experimental group took place during the training hours.

Table 1

	Experimental Group		Control Group	
	Initial Testing	Final Testing	Initial Testing	Final Testing
Age (years)	8,6 ± 0,765	9 ± 0,765	8,8 ± 0,954	9,2 ± 0,954
Weight (kg)	28,8±3,4	28,68±3.41	27,8±2,8	29,7±2,71
Waist (cm)	129,6±4.05	134,1±3,48	128,7±2,49	132,7±2,43
Average length superior	52±1,309	54,1±1,241	51,1±1,55	53,3±9,19
Average length inferior	71,8±2,168	74,1±1,64	71,5±1,92	76,3±1,84
Mobility (x^o)	96±1,85	104,12±1,24	96,37±2,27	100±2,39

After the measurements characterizing the subjects, the following assessment tests were carried out both for physical and technical training.

Tests for physical training:
Test I.

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From hanging with the back at fixed scale to lift the legs straight to the point of grasping. Record the number of correct repetitions for 30 seconds.

Test II.

From lying face down with legs blocked, extend the trunk with arms stretched out above your head in trunk extension. Record the number of repetitions for 30 seconds.

Test III.

From hanging at fixed bar with the body and arms outstretched, perform body traction until the chin passes over the bar. Record the number of correct repetitions for 30 seconds.

Test IV.

From standing on his/her hands on low, mobile bar, with legs stretched, the subject exercises trunk flotation. Record the number of repetitions for 30 seconds.

Tests for technical training:

Testul V.

From standing on his/her hands on top bar, the subject performs a series of 10 consecutive giant circles. Note the correct number of executions in 10 repetitions.

Test VI.

It is performed on the top bar of the device. From standing on his/her hands on the bar, the subject performs a giant circle bwd. Note the correct execution of the drill with marks from 1 to 10.

Note: For these tests we asked two national judges for help, the marks represent the average from the two judges and include a decimal. These evaluation tests were carried out both at the beginning and at the end of the experiment, on both the experimental and control group.

Operational models

The operational models presented below were made to strengthen and improve the giant circle backward on uneven bars, with the IVth category.

The accurate and fast acquiring of the element requires the use of some special equipment for helpful and preparatory drills. Thus, we used an installation which consists in the replacement of the upper wooden bar with a metallic rod, 3,4 centimetres in diameter, having attached a plastic tube outside, 3,4 centimetres in diameter. The subjects perform a fixed inlet on plastic tube with the help of textile webbing.

Due to the sliding of the plastic tube on the metallic rod, this installation allows for the easy execution of operational models, preventing the friction between the subjects' palms and the wooden bar.

The operational models proposed for strengthening and improving the giant circle backward are:

Operational model I.

From hanging at the described equipment, the subject performs swinging back and forth. Perform 3 sets of 10 repetitions.

Operational model II.

From hanging, the subject performs swinging back and forth aiming at strengthening the action prior to the so-called fight action „a discrete square" as well as keeping posture in the second part of the giant circle bwd, i.e. the lifting by standing on their hands which is a slight square (figure no. 2). Perform 3 sets of 10 repetitions per set.

Operational model III.

From standing on his/her hands, the subject performs tied giant circles bwd without help, watching the correct passage of the trunk through all the movements which make up the giant. Perform 3 sets of 10 repetitions.

Operational model IV.

From standing on his/her hands, the subject performs tied giant circles bwd without help, aiming at the accuracy and smoothness of the element. Perform 3 sets of 10 repetitions.

Note: for the accuracy of movements, the subjects perform all operational models with thin sponges between the knees and the toes of the lower limbs.

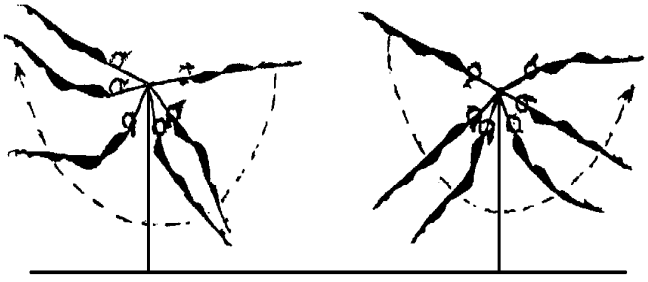

Figure no. 1

Statistical treatment

Value populations were characterized by estimating the central tendency and variability. Thus, this paper mentions the average and standard deviation in the form of the expression: $X \pm DS$.

The differences between value populations have been obtained by applying the test "t" for both

dependent samples (correlated) of low volume and independent samples (uncorrelated) of low volume.

The differences were considered significant for the following thresholds of significance: $p < 0,05$; $p < 0,005$; $p < 0,0005$.

For the interpretation of the data resulted from the tests carried out for physical and technical training, we have also used the Pearson test " r " to record existent correlations between performances on physical training and performances on technical training.

Results Table 2

Table no. 2a DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING

PARAMETERS	TEST I	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	26,5 ± 2,07	26,3 ± 2,2
VARIABILITY COEFFICIENT	7,811%	8,369%
FINAL TESTING X ± DS	32,2 ± 1,58 ●●	31,3 ± 1,306 ●
VARIABILITY COEFFICIENT	4,962%	4,169%

● - significantly different statistically from the initial testing at $p < 0,005$
●●-significantly different statistically from the initial testing at $p < 0,0005$

Table no. 2.**b DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	X ± DS	● 26,5 ± 2,07
CONTROL GROUP	X ± DS	26,3 ± 2,2

	Experimental Group		Control Group	
	Initial Testing	Final Testing	Initial Testing	Final Testing
TEST I abdominal curls	26,5±2,07 7,811%	32,2±1,582 4,962%	26,3±2.2 8,369%	31,3±1,306 4,169%
TEST II extensions	36,3±2,201 6,064%	43,3±1,6 3,695%	35,8±1,603 4,454%	41,5±1,197 2,884%
TEST III tractions	17,8±2,476 13,911%	24,6±2,134 8,675	18,2±2,493 13,7%	23,8±2,296 9,649%
TEST IV push-ups	17,5±1,309 7,481%	21,7±1,278 5,891	17,2±1,166 6,78%	21,5±1,195 5,559%
TEST V successful results out of 10	4,25±0,886 20,855%	9±0,755 9,44%	4±1,069 26,72%	7,25±0,709 9,77%
TEST VI grade	7,33±0,529 7,21%	9,43±0,119 1,268%	7,27±0,229 3,154%	8,21±0,3 3,658%

● – statistically insignificant from the initial testing of control group at $p > 0,05$

Table no. 2.**c DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	X ± DS	● 32,2 ± 1,582
CONTROL GROUP	X ± DS	31,3 ± 1,306

● – statistically insignificant from the final testing of control group at $p > 0,05$

Table no. 3.a **DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING**

PARAMETERS	TEST II	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	36,3 ± 2,201	35,8 ± 1,603
VARIABILITY COEFFICIENT	6,064%	4,454%
FINAL TESTING X ± DS	43,3 ± 1,6 ●●	41,5 ± 1,197 ●
VARIABILITY COEFFICIENT	3,695%	2,884%

● - significantly different statistically from the initial testing at $p < 0,005$

●●-significantly different statistically from the initial testing at $p < 0,0005$

Table no. 3.b. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **36,3 ± 2,201**
CONTROL GROUP	**X ± DS**	**35,8 ± 1,603**

●– statistically insignificant from the initial testing of control group at $p > 0,05$

Table no. 3.c **DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **43,3 ± 1,6**
CONTROL GROUP	**X ± DS**	**41,5 ± 1,197**

●– statistically insignificant from the final testing of control group at $p > 0,05$

Table no. 4.a **DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING**

PARAMETERS	TEST III	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	**17,8 ± 2,476**	**18,2 ± 2,493**
VARIABILITY COEFFICIENT	**13,911%**	**13,7%**
FINAL TESTING X ± DS	**24,6 ± 2,134** ●●	**23,8 ± 2,269** ●
VARIABILITY COEFFICIENT	**8,675%**	**9,649**

●●- significantly different statistically from the initial testing at $p < 0,0005$
● - significantly different statistically from the initial testing at $p < 0,005$

Table no. 4.b. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	**X ±DS**	● **17,8 ± 2,476**
CONTROL GROUP	**X ±DS**	**18,2 ± 2,493**

● – statistically insignificant from the initial testing of control group at $p > 0,05$

Table no. 4.c. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **24,6 ± 2,134**
CONTROL GROUP	**X ± DS**	**23,8 ± 2,296**

● – statistically insignificant from the final testing of control group at $p > 0,05$

Table no. 5.a **DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING**

PARAMETERS	TEST IV	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	**17,5 ± 1,309**	**17,2 ± 1,166**
VARIABILITY COEFFICIENT	**7,481%**	**6,78%**
FINAL TESTING X ± DS	**21,7 ± 1,278** ●●	**21,5 ± 1,195** ●
VARIABILITY COEFFICIENT	**5,981%**	**5,559%**

●●- significantly different statistically from the initial testing at $p < 0,0005$
● - significantly different statistically from the initial testing at $p < 0,005$

Table no. 5 b. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **17,5 ± 1,309**
CONTROL GROUP	**X ± DS**	**17,2 ± 1,166**

● – statistically insignificant from the initial testing of control group at $p > 0,05$

Table no. 5.c. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **21,7 ± 1,278**
CONTROL GROUP	**X ± DS**	**21,5 ±1,195**

●– statistically insignificant from the final testing of control group at $p > 0,05$

Table no. 6.a. **DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING**

PARAMETERS	TEST V	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	**4,25 ± 0,886**	**4 ± 1,096**
VARIABILITY COEFFICIENT	**20,855 %**	**26,72 %**
FINAL TESTING X ± DS	**9 ± 0,755** ●●	**7,25 ± 0,709** ●
VARIABILITY COEFFICIENT	**9,44 %**	**9,77 %**

●●- significantly different statistically from the initial testing at $p < 0,0005$
● - significantly different statistically from the initial testing at $p < 0,005$

Table no. 6.b. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **4,25 ± 0,886**
CONTROL GROUP	**X ± DS**	**4 ± 1,069**

● – statistically insignificant from the initial testing of control group at $p < 0,05$

Table no. 6.c. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **9 ± 0,755**
CONTROL GROUP	**X ± DS**	**7,25 ± 0,709**

●– statistically insignificant from the final testing of control group at $p < 0,0005$

Table no. 7.a. **DIFFERENCE BETWEEN AVERAGES FROM INITIAL TESTING TO FINAL TESTING**

PARAMETERS	TEST VI	
	EXPERIMENTAL GROUP	CONTROL GROUP
INITIAL TESTING X ± DS	**7,33 ± 0,529**	**7,27 ±0,229**
VARIABILITY COEFFICIENT	**7,21%**	**3,154%**
FINAL TESTING X ± DS	**9,43 ± 0,119** ●●	**8,21 ± 0,3** ●
VARIABILITY COEFFICIENT	**1,268%**	**3,658%**

●● - significantly different statistically from the initial testing at $p < 0,0005$
● - significantly different statistically from the initial testing at $p < 0,005$

Table no. 7 b. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE INITIAL TESTING**

	PARAMETERS	INITIAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **7,33 ± 0,529**
CONTROL GROUP	**X ± DS**	**7,27 ± 0,229**

● – statistically insignificant from the initial testing of control group at $p > 0,05$

Table no. 7.c. **DIFFERENCE BETWEEN THE TWO GROUPS AT THE FINAL TESTING**

	PARAMETERS	FINAL TESTING
EXPERIMENTAL GROUP	**X ± DS**	● **9,43 ± 0,119**
CONTROL GROUP	**X ± DS**	**8,21 ± 0,3**

●– statistically insignificant from the final testing of control group

Table no. 8 **CORRELATIONS**

	TEST V	TEST VI
TEST I	**0,7164**	**0,7293**
TEST II	**0,2365**	**0,2987**
TEST III	**0,6421**	**0,6981**
TEST IV	**0,8972**	**0,8523**

$r < 0,6215$ – correlated statistically insignificant at $p > 0,05$;
$r > 0,6215$ – correlated statistically significant at $p < 0,05$;

$r > 0,7887$ -- correlated statistically significant at $p < 0,01$;

Discussions

Comparative analysis of recorded parameters in the experimental group from initial testing to final testing.

■ Regarding the weight of the experimental group subjects, it was noticed an increase of 1.8 kg from initial testing to final testing, which indicates a normal progress of growth at this age. This increase is not large and therefore it does not affect in any way (±) the correct execution of the giant circle backward.

■ With regard to the subjects' size in the experimental group, it was registered an increase of 4,5cm from initial testing to final testing.This parameter has also recorded increases in accordance with the subjects' age, without influencing the element execution.

■ With regard to the length of the upper and lower limbs, there are noticed some increases by 2.1cm and 2.3 cm respectively, from initial testing to final testing. This parameter is very important in consolidating the element, but insignificant increases from the initial testing show a small influence.

■ Concerning the scapular-humeral mobility, the subjects have registered significant increases of 8 degrees from initial testing to final testing. This statistically significant increase has a major influence on the accuracy of element execution, contributing to the improvement of a good posture and the easy passing through movement.

■ With regard to test I, the difference between averages from initial testing to final testing is of 5.7 abdominal curls, this being significantly different statistically at $p < 0,0005$ (table 2.a). We mention that abdominal strength is very important in performing the element, maintaining the vertical position of the body during execution. The result is that the increases are important and necessary.

■ With regard to test II, the difference between averages from initial testing to final testing is of 6.8 trunk extensions, this being significantly different statistically at $p < 0,0005$ (table 3.a.). We mention that back muscles tone contributes to adopting a good posture during execution, hence the progress which is registered at this test highly influences the strengthening of the giant circle backward.

■ In terms of tests III and IV, the subjects have registered increases of 6.8 tractions and 4.2 push-ups, respectively, these being significantly different statistically at $p < 0,0005$ (tables 4.a. and 5.a.). Arms force is a very important quality both in flexion and in extension, and it must be developed to higher parameters. The lack of force leads to the failure of the partial actions of the element, both in hanging and in arms support. We consider that the progress registered by the gymnasts is best for the strengthening of the giant circle backward.

■ The analysis of the results obtained by the experimental group at test VI shows a difference of 4.7 correct executions, this being significantly different statistically from the initial testing at $p < 0,0005$ (table 6.a.). This indicates a considerable progress registered by the subjects, largely due to the operational models proposed and applied to the experimental group.

■ The analysis of the results obtained by the experimental group at test V shows an increase in grade from initial testing to final testing with 2.10 units (points), which is significantly different statistically from initial testing at $p < 0,0005$ (table 7.a.). This shows a real progress technically, the grade reflecting the level of technical preparation.

■ With regard to anthropometric parameters, the differences are approximately equal to the results of the experimental group, the groups having the same initial level of development. We state that the development of anthropometric parameters is not subject to research.

■ Regarding the results of the physical tests, the subjects of the control group have registered increases significantly different statistically at $p < 0,0005$ (tables 2a,3a,4a,5a.), which shows that this group has the physical support necessary to the consolidation of the giant circle bwd element.

■ In terms of physical tests, the difference between the averages of the two groups at initial testing is insignificantly different statistically at $p > 0,05$ (tables 2b,3b,4b,5b), this is normal because both groups were at the same level of training at the beginning of the experiment.

The comparative analysis of the two groups' averages at final testing indicates a statistically insignificant difference at $p > 0,05$ (tables 2c,3c,4c,5c), this is because, in terms of physical training, both groups have worked by fairly standard practices.

■ Regarding test V, the analysis of the two groups shows a statistically insignificant difference from the initial testing at $p > 0,05$ (table 6.b.), which is due to the initial homogeneity of the two groups. However, at the final testing, the difference between averages is significantly different statistically from the control group at $p < 0,0005$ (table 6.c.). This shows a significant improvement of the technique at the level of the experimental group, which is due to the operational models applied.

■ Regarding test VI, the comparative analysis of the two groups shows an insignificant difference statistically at $p > 0,05$ (table 7.b.) at the initial testing to the control group, and a significant difference statistically at $p < 0,0005$ (table 7.c.) at the final testing against the control group, indicating that the proposed operational models have contributed to the correct acquiring of the technique, significantly improving their grades for the correct execution of the element.

■ When correlating test I of physical training with tests V and VI of technical training, we noticed significant results statistically ($r > 0,6215$) at $p < 0,05$ (table 8.). The positive outcome of this correlation is favourable to us since it confirms the close relationship

between the progress registered at the level of abdominal muscles and the technical progress made.

■ When correlating test II of specific physical training with tests V and VI of technical training, we found insignificant results statistically ($r < 0,6215$) at $p > 0,05$ (table 8.). Hence we conclude that the development level of back muscles does not influence significantly sport performance in terms of strengthening the element.

■ When correlating test III of physical training with tests V and VI of technical training, we noticed significant results statistically ($r > 0,6215$) at $p < 0,05$ (table 8.). This demonstrates that the improvement of this drill performance helps strengthen the giant circle backward.

■ When correlating test IV of physical training with tests V and VI of technical training, we found statistically significant results ($r < 0,7887$) at $p > 0,005$ (table 8.). This proves that the development level of arms muscles significantly influences progress in the technical preparation.

Following the above we conclude that the progress made by gymnasts on the physical level has greatly helped them in the process of strengthening giant circle backward.

Conclusions and proposals

Here are the main conclusions to be drawn from the above discussions:

■-as a result of reflecting the findings of the technical tests, we can conclude that the proposed operational models have led to the consolidation of the giant circle backward at uneven bars.

■-by evaluating the percentage in which the selected operational models have improved technical performance, we notice that within test V, the experimental group has registered increases of 15.3% more than the control group (47,8% progress for the experimental group compared to 32,5% progress for the control group), and within test VI, the experimental group has registered increases of 11,6% more than the control group (21% progress for the experimental group as against 9,4% progress for the control group).

■-the reflection of the physical tests' results shows that IVth category gymnasts have the necessary physical support to strengthen the giant circle backward.

■-as a result of analyzing the findings of the correlations between the final level of technical training and the final level of physical training, we conclude that the achieved performances of the gymnasts on the physical level represent the essential support for consolidating the giant circle backward. From this we can infer the close link between technical and physical preparation.

For the future, we suggest including in the training programmes of IVth category gymnasts at uneven bars the performance on the proposed equipment by means of the selected operational models, due to the rapid growth of technical prowess.

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