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Original article

IMPROVING ARTISTIC JUMP AT BEAM

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Abstract

Objectives. The aim of the research is to develop the explosive force at the lower limbs in artistic jump at the beam in artistic gymnastics. The application of plyometric exercises with and without difficulties will lead to the development of the explosive force at the lower limbs and implicitly of the technique of execution of the artistic elements specific to the apparatus beam.

*Methods of research***.** The study was conducted on 2 groups of 10 gymnasts each during a year. The drive systems were designed with and without difficulties, elastic bands, sponge cubes and gym bench. To achieve the plyometric exercise program, we used an elastic support attached to the sports belt of gymnast. During the research two tests were carried out involving 3 motor tests and 4 technical tests. The motor tests focused on lower limb force and the technical tests concerned specific elements of the competition exercises.

Results. Considering the application of the plyometric means of the proposed and performed exercises in the experimental group, it is noteworthy that this group obtained statistically significant meanings compared to the control group in the same tests. These results demonstrate a significant increase in the sports performance of the experiment group. At the same time, the applied tests show a positive value added for the gymnasts practicing this branch as evidenced by the results of the official competitions of these athletes in this category.

Conclusions. We believe that the program developed and applied has had the expected effects and therefore we propose further training that includes the plyometric exercises for developing the explosive force of the gymnasts.

*Key words***:** artistic gymnastics, artistic jump, beam.

Introduction

Performance gymnastics has been rapidly developing over the years, with the emergence of new technical requirements.

Researchers and coaches together with the gymnasts are concerned about achieving perfection.

In order to achieve this goal, the somatic type of gymnasts has a special role, through intensive researches at national and international level, with the establishment of a general somatic model for gymnastics and for groups of samples.

Explosive force conditions the performance in artistic gymnastics by its major implications in the realization of artistic elements belonging to certain fundamental groups and which also contrive the difficulties for which bonuses are granted (Grigore, 2002)

To take into accout of the above mentioned amendments, the appreciation of the difficulty elements is made by reference to: the height and fixation of the shape of the jumps and the degree of opening the coxo-femoral joint (the amplitude of the movement), it is difficult to achieve the incremental increase of the bodily difficulties.

The pliometric training, though old enough as a conception and quite present in the themes of many research papers, is less present in works on artistic gymnastics. For this reason, I think it is necessary to review some training moments with the inclusion of specific drills to develope the explosive force (Bompa , 2001).

The Beam is one of the most difficult apparatus in artistics gymnastics, requiring a range of psycho-physical qualities such as: coordination, ability to move, space-time orientation, explosive force, mobility, courage, sensitivity, artistic sense, self-control capacity, silence and safety when piruetes, artistic jumping or acrobatic torrents are only performed on a 10 cm surface.

In the sagittal, frontal and horizontal plane, beam exercises are made up of procedures characterized by a high coefficient of spatio-temporal orientation and coordination.

Artistic training harnesses the competition imposed exercises on gymnastics both nationally and internationally levels, and gymnasts must have a rich quantity of motor skills specific to dancing and for their execution at an appropriate pace with maximum amplitude, expressiveness and elegance (Damian., Popescu, 2000).

An artistic presentation is one in which the gymnast demonstrates its ability to transform the

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exercise from a well-structured composition into a performance. To do this, the gymnast must show creativity, confidence, personal style, and the perfect technique to get bonuses (Macovei, 2007).

The purpose of the research

The aim of the research is to develop the explosive force at the lower limbs in artistic jump at the beam in artistic gymnastics.

Research hypothesis

The application of plyometric exercises with and without difficulties will lead to the development of the explosive force at the lower limbs and implicitly of the technique of execution of the artistic elements specific to the apparatus beam.

Methods of research

The study was conducted on 2 groups of 10 gymnasts each during a year (grupa experiment - 125,9±5,38 cm și grupa control 121,1±3,90 cm).

Probe motrice (Motricity tests):

Developpe jump and Sissone jump: Video footage was shot using a 60 FPS camera. This camera was fixed on a the tripod in a perpendicular position to the installations on which the drive systems were deployed. The images were processed with an online editing program (https: pislr.com/express/). The data recorded by Developpe jump and Sissone jump were made with the Hudl Technique Elite program with a video playback capacity of 60 FPS (180° inferior limb opening angle). Is measured, in degrees, the opening of the legs. Each athlete is given two attempts and the best one is taken in consider.

Strength to maintain the raised leg extended forward at 90 ° - in seconds.

Strength to maintain the raised leg extended forward above 90 ° - in seconds.

The drive systems were designed with and without difficulties, elastic bands, sponge cubes and gym bench. To achieve the plyometric exercise program, we used an elastic support attached to the sports belt of gymnast. During the research two tests were carried out involving **3 motor tests** focused on lower limb force.

Results

Initial testing.

The initial testing revealed the level of development of the explosive force of the lower limbs of the gymnasts, these measurements being necessary for assessing the evolution of the athletes. From the first test, gymnasts have a relatively equal level of physical training, which is why the two coaches confirmed that it is necessary to develop a special physical training program for athletes, a program that will lead to the development of impuls vertical jump.

At the Developpe jump on the beam trial, the experiment group obtained an average of 171.6 ± 9.87° in the initial test with a coefficient of variation of 8, 96%, indicating a homogeneous collective and an average of 184 ± 7.41° in the final test, with a coefficient of variation of 5.37%, the degree of homogeneity in final testing being increasing.

In the same motor test, the control group obtained an average of 140.9 ± 6.38° in the initial test, with a coefficient of variation of 14.362%, indicating an average homogeneity and an average of 150.6 ± 5.94° in the final test, with a coefficient of variation of 9.312%, increasing it to nominal values by 5.05%, also indicating an average homogeneity team. This is represented graphically in the figure below:

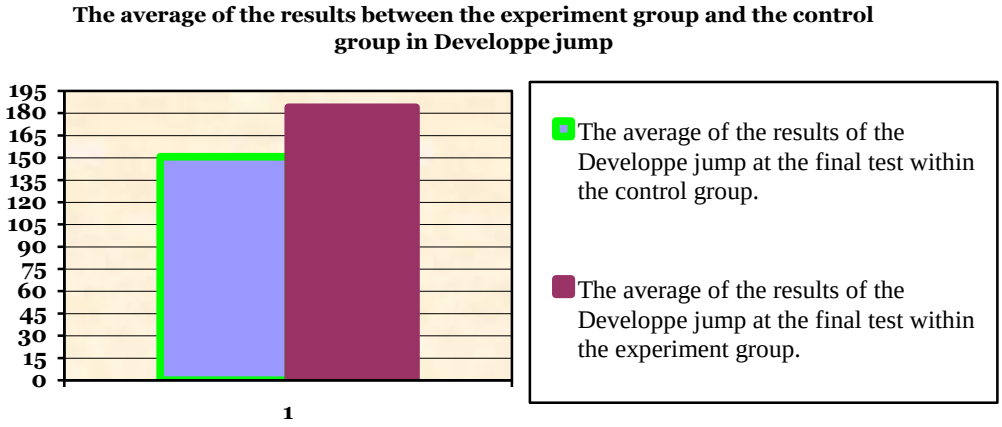

Figure 1 – Comparison of the average of the results between the experiment group and control group at Developpe jump.

At the sample Sissone jump on the beam trial, at the initial test, the experiment group obtained an average of 170.8 ± 13.15° with a coefficient of variation of 5.73%, while the control group obtained an

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average of 139 ± 14.82°, with a coefficient of variation of 8.48%. We see an increase in the average of 31.8 cm in favor of the experimental group, while the coefficient of variability indicates for both groups a homogeneous collective.

The final test showed an increase in the average of 9.2 cm in favor of the experimental group, the avarage of this group being 180 ± 10.32°, while the mean of the control group was 150.9 ± 11.57°, the coefficient the variability being 6.48% for the experimental group and 9.59% for the control group. These aspects are graphically represented in the figure below:

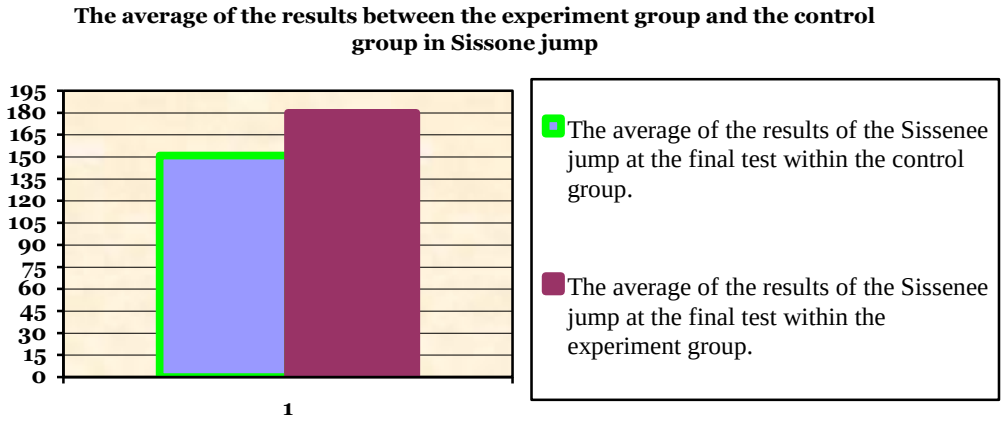

Figure 2 – Comparison of the average of the results between the experiment group and control group at Sissone jump.

At the height-retaining leg held forward at 90°, the experimental group obtained an average of 13.2 ± 4.70 seconds on initial testing, with a coefficient of variability of 13.126%, indicating a mean average homogeneity, and an average of 22.7 ± 6.41 seconds at final testing with a coefficient of variation of 5,974%. An average increase of 9.5 seconds from initial testing to final testing, as well as an improvement in homogeneity, is seen in final testing, with the team being homogeneous.

In the same test, the control group obtained an average of 11.7 ± 3.23 seconds in the initial testing with a coefficient of variability of 18.384%, indicating an average homogeneity group and an average of 15.9 ± 2, 84 seconds on the final test, with a coefficient of variation of 14.876%, increasing it to nominal values by 3.508%, also indicating a mean of homogeneity.

These aspects are graphically represented in the figures below:

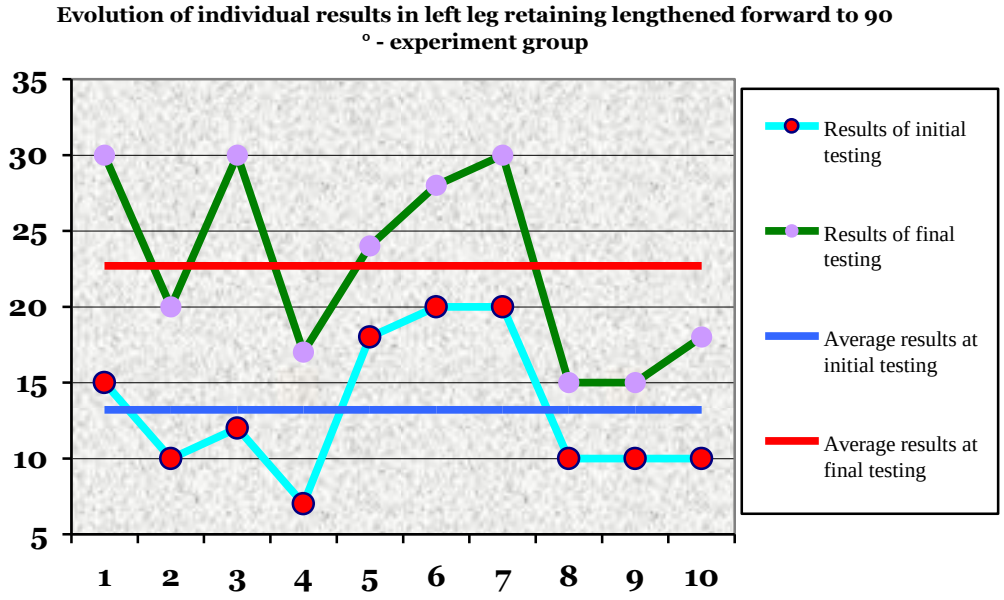

Figure 3 – Graphical representation of the evolution of the results in the left leg stretched forward at 90° retaining test – experiment group.

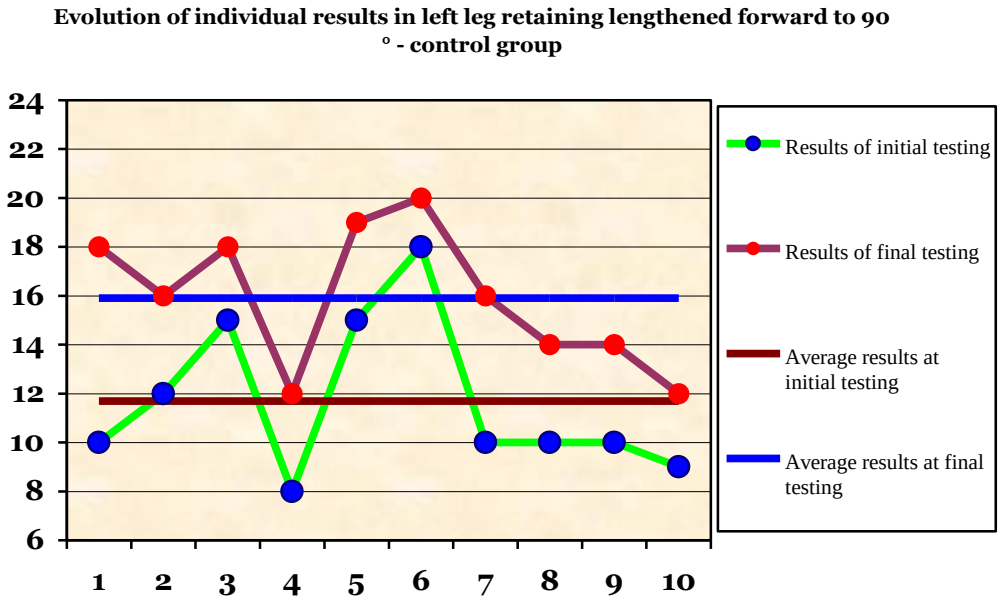

Figure 4 - Graphical representation of the evolution of results in the left leg retaining lengthened test at 90 ° forward – control group.

At the height-retaining leg held forward at 90° test, the experimental group obtained an average of 12.9 ± 4.38 seconds with a coefficient of variation of 13.909%, while the control group obtained at the same test an average of 10.8 ± 2.44 seconds, with a coefficient of variation of 7.408%.

We see an increase in the average of 2.1 seconds in favor of the experimental group, while the coefficient of variability shows a group of average homogeneity for the experiment group and a homogeneous group for the control group.

The final test showed an increase in the average of 8 seconds in favor of the experimental group, the mean of this group being 23.2 ± 6.21 seconds, while the mean control group was 15.2 ± 3.29 seconds, the coefficient the variability being 6.294% for the experimental group and 9.324% for the control group.

As we can see, in the experimental group, the coefficient of variability increases significantly from the initial testing, to the final testing, which now indicates a homogeneous collective.

This is graphically represented in the figures below:

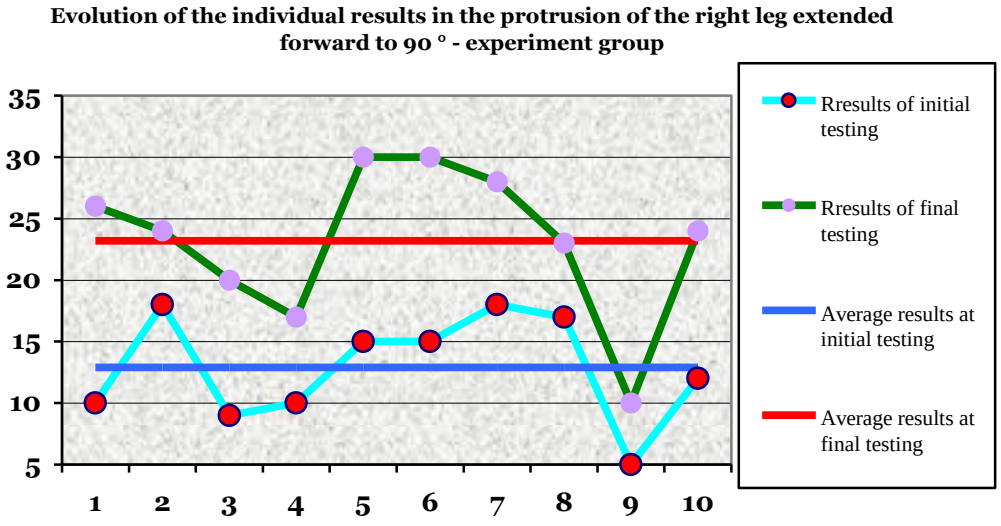

Fig. 9 Graphic representation of the evolution of the results in the high right leg held forward test at 90 ° - experiment group

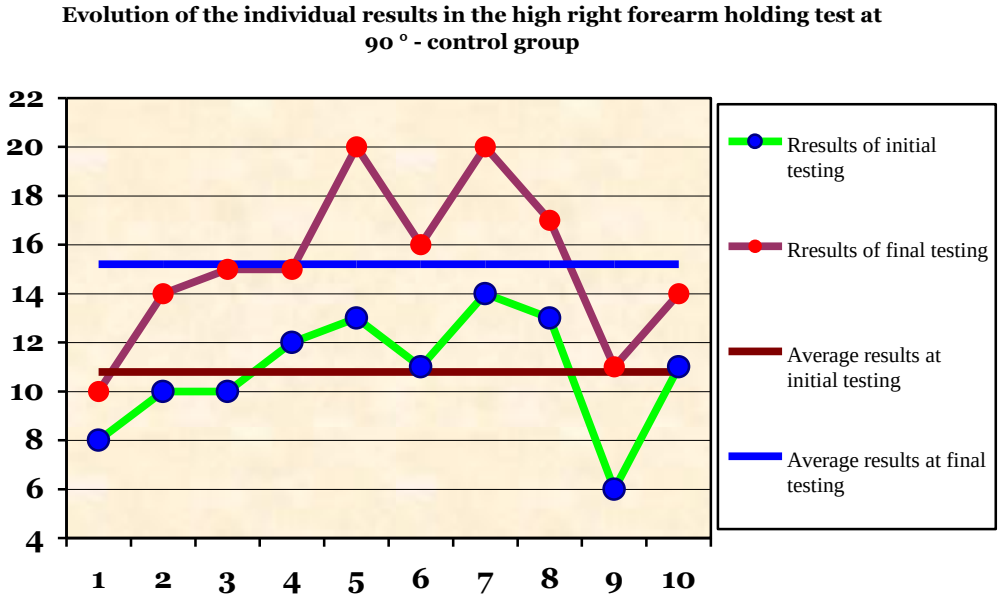

Fig. 10 Graphical representation of the evolution of results in the protruding foreleg to 90 ° forward test - the control group

In the left leg retaining assay stretched forward over 90 °, at baseline the experiment group achieved an average of 9.8 ± 2.34 seconds, 1.8 seconds better than the control group average at the same test that is 8.1 ± 1.72 seconds.

In the experimental group, the variability coefficient of 10.088% indicates an average homogeneity group, but only 0.088% above the limit that shows a homogeneously collective, while in the control group it indicates an average homogeneity group, its value being of 13.633% . In the final test, the experiment group obtained an average of 15.1 ± 4.22 seconds, while the mean control group was 12.2 ± 2.86 seconds, the coefficient of variability indicating for both groups a group with moderate homogeneity.

This is graphically represented in the figures below:

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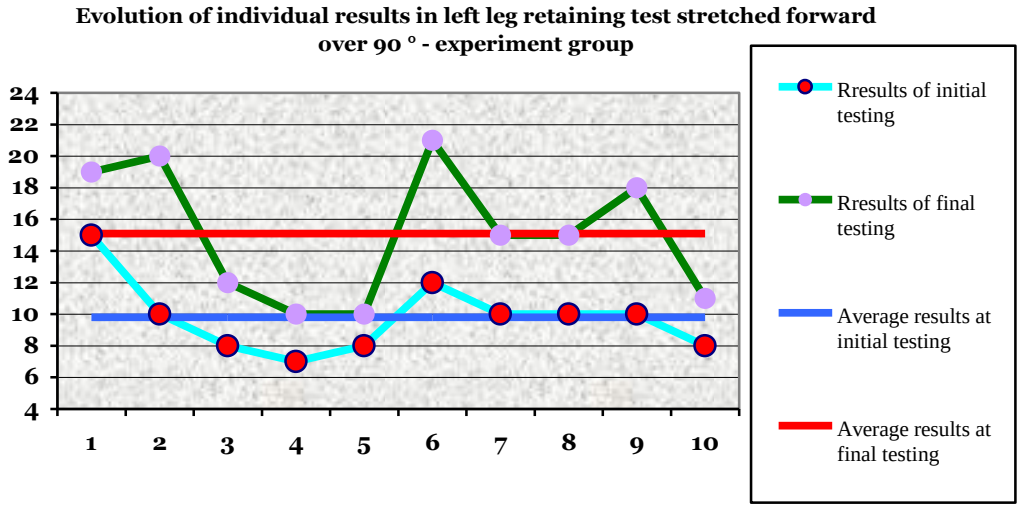

Fig. 11 Graphical representation of the evolution of results in the lean leg retaining test stretched forward over 90 ° - experiment group

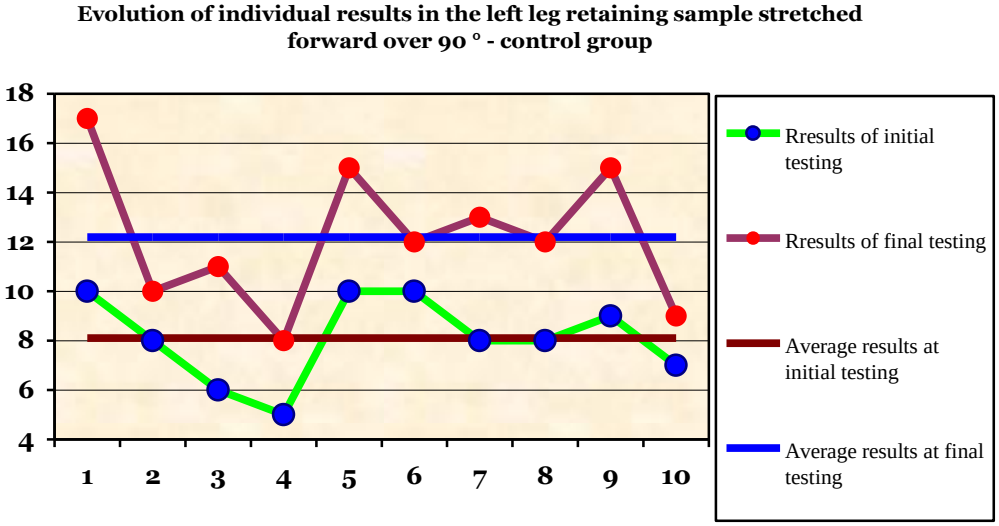

Fig. 12 Graphical representation of the evolution of results in the left leg retaining sample stretched forward over 90 ° - control group

In the forward-to-90 foot assay, the experiment group obtained an average of 9.9 ± 2.60 seconds in the initial test with a coefficient of variation of 12.221%, indicating a mean of homogeneity, and an average of 17.2 ± 5.67 seconds in the final test, with a coefficient of variation of 11.829%, the degree of homogeneity in final testing being increasing. An average increase of 7.3 seconds from initial testing to final testing is observed.

At the same actuation system, the control group obtained an average of 8.7 ± 2.45 seconds in the initial test, with a coefficient of variation of 16.446%, indicating a collective of average homogeneity, and an average of 12, 4 ± 2.06 seconds in the final test, with a coefficient of variation of 16.378%, also indicating an average of a homogeneity. This is graphically represented in the figures below:

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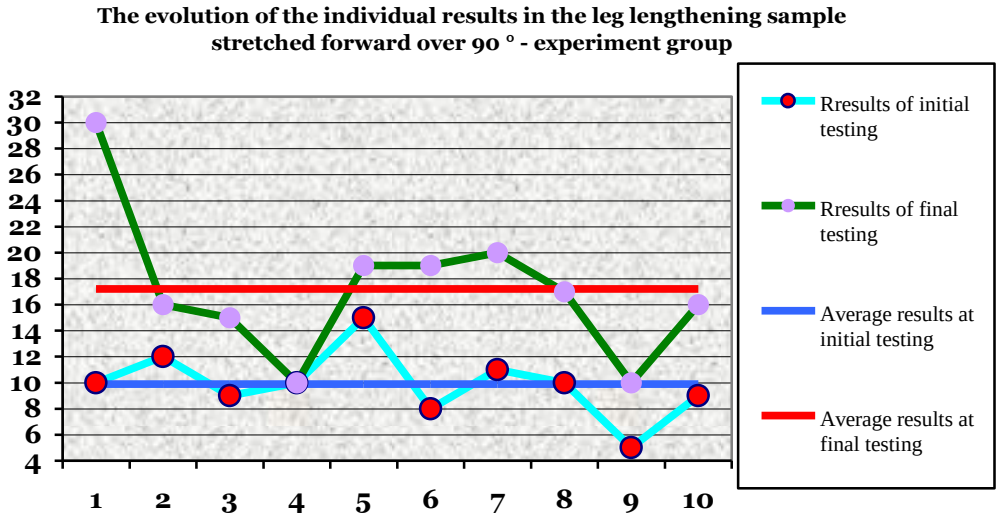

Fig. 13 Graphical representation of the evolution of the results in the straight forward leg sample over 90 ° - experiment group

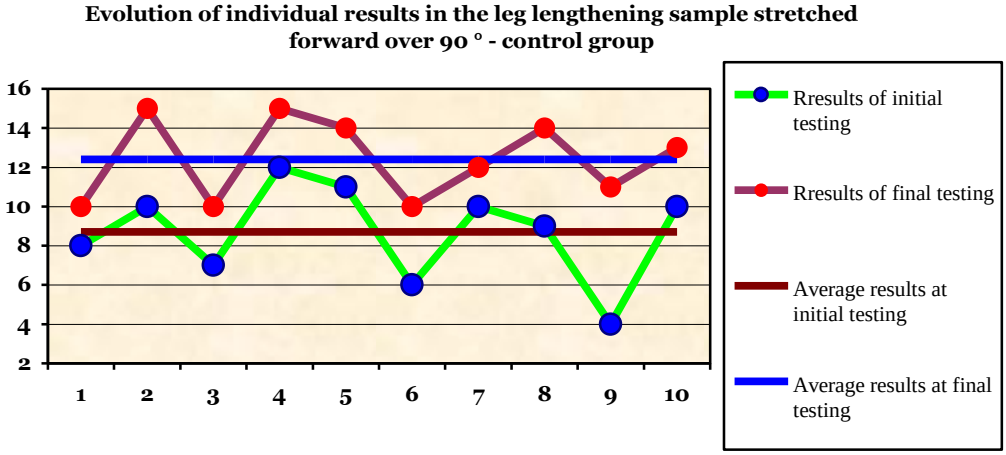

Fig. 14 Graphical representation of the evolution of results in the forward leg lengthening sample over 90 ° - control group

Discussion

Considering the application of the plyometric means of the proposed and performed exercises in the experimental group, it is noteworthy that this group obtained statistically significant meanings compared to the control group in the same tests (Enoka, 1994). These results demonstrate a significant increase in the sports performance of the experiment group. At the same time, the applied tests show a positive value added for the gymnasts practicing this branch as evidenced by the results of the official competitions of these athletes in this category (http://www.humankinetics.com).

Conclusions

The conclusions drawn from the statistical analysis and interpretation of the results are as follows:

1. The increases in explosive force indices were significantly better in the experimental group that benefited from the proposed means of testing, vertically and horizontally detained, showing significantly better values following the use of pleiometric means;

2. The experiment demonstrated the importance of improving artistic jumping techniques through artistic gymnastics.

3. The individual progress of gymnasts was highlighted by the specific tests applied in our research, but we also believe that the native values of motor

skills have contributed to the correct acquisition of artistic gymnastics.

The research hypothesis was confirmed by the results obtained in the general and specific driving tests, as well as by the results obtained in competitions by the group's experimental group.

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