

EFFICIENCY OF STRENGTH DEVELOPMENT TROUGH SPECIFIC AQUATIC MEANS FOR JUNIOR BASKETBALL PLAYERS

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Abstract: *U15 basketball juniors are at puberty, during this period there are psycho-physiological transformations with profound repercussions in terms of their physical constitution. In the training of junior basketball players at this stage, in addition to learning the correct technical and tactical procedures and improving motor skills, it is recommended by specialists to emphasize a harmonious physical development, a good functioning of the body with special attention to posture and functional disorders that may occur during this period. The study aims to implement a program of exercises specific to aquatic activities adapted to the particularities of U15 junior basketball players and to find out the effects produced on the increase of physical strength for these athletes.*

Key words: *basketball, juniors, physical training, strength, aquatic environment.*

1. Introduction

In athletes at puberty, when “there is both transient disharmony of body proportions, a consequence mainly due to the increase in limb length and bust height, as well as functional changes, especially in the cardiovascular system and respiratory system - which reduces, in general, the capacity for effort, it is recommended to work with a gradual and individualized load for the general development of a robust musculature

meant to strengthen the spine and the skeletal system in general. Methodical training indications: ensuring a harmonious general physical development corresponding to the respective period of age; conducting a varied, stimulating and differentiated training; prior development of muscle strength as a condition for the completion of sports technique. "[7]

Playing basketball has many benefits, the locomotor system is used intensely and continuously, but the young athlete is often susceptible to injuries or certain

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aliments, due to physical and physiological changes specific to this period and due to the fact that the process of physical development determined of the specifics of the sport practiced is not always uniform, and the different parts of the body are vulnerable at puberty.

"The causes and mechanisms of production are specific to the practice of sports (predisposing, favouring and triggering factors), depending on the athletes, the coach, the mistakes of organizing competitions, food shortages, defects in sports equipment, etc." [1]

Most basketball injuries occur in the tendons and ligaments, which are weaker than the muscles that contract, especially at puberty. Basketball-specific running trajectories are complex and involve rapid changes of direction, pirouettes, sudden stops that exert enormous demands on structures that ensure the integrity of the wrist. Therefore, action systems to strengthen the joints have also been introduced in the aquatic training program.

According to the author Dragan I. "characteristic for the basketball game are the multiple jumps on the board, which require a lot of knee joints; also, twists, sudden stops, sprints, require equally the joints of the knees and ankles. The demand for the locomotor system is asymmetrical in basketball".[2]

Articles such as : "Impact forces of plyometric exercises performed on land and in water" [5], "Ground reaction forces of variations of plyometric exercises on hard surfaces, padded surfaces and water" [6], "Growth pains in young athletes" [3] strengthened our conviction to continue present research, looking for ways to develop junior basketball players strength through new, attractive and non-invasive methods.

We mention that in the experiment, organized in order to establish the level of development of the muscular strength of the junior basketball players, in which a number of 20 athletes participated, aged between 13 and 14, organized in two groups, one experimental that will carry out a specific program of aquatic activity and a control group. The subjects for our study were the enlisted junior basketball players at ACS Galactica Braşov, and this study took place between September 2018 and April 2019. The control team benefited from similar training conditions with the experimental team.

During the research, the activity with the experimental group, within the Olympic Complex in Braşov where there was a large pool (50m long and 2 m deep), a small water pool (15m long and 1.2 m deep) and a field of outdoor sports and the control group carried out its training program in the gym of school no. 19 from Braşov.

The experiment began by testing the strength for the upper limbs and assessing the difference in strength between the dexterous and non-dexterous arm performed with a dynamometer and to test the strength in the lower limbs to apply the long jump test on the spot.

"Dynameters and scales are used to measure the maximum muscle strength in kinesiology." [4]

The program performed by the athletes of the experimental group was designed by us and included different means, variously selected, with *swimming exercises, aquatic plyometrics, aqua circuit, aqua-gym, aqua-stretching*, which were grouped in an operational training program. During the research, the following teaching materials were used: swimming-specific materials (rafts, floats, palm trees, swimming paws, extensors),

for aqua circuit (dumbbells, elastic bands, wands, medicine ball, sandbags, basketball, stopwatch, whistle, etc.). The aquatic means used to improve the strength of the lower and upper limbs of the junior basketball players used in the research were:

Swimming, through its specific procedures and means, using water resistance creatively, using only separate work of arms or legs, by performing the movement with only one arm, by using specific materials (palms, floats, rafts, paws, extensors etc.)

Aquatic plyometry training (aquapiometric): plyometric exercises are used to produce fast and strong movements, aims to develop strength in speed and by performing them in the water we aim to reduce the pressure on the joints when landing.

Aqua-circuit: working in the circuit involves the successive performance of exercises for the development of strength in combination with endurance. The circuits used in the preparation of the experiment group were short of 6 exercises.

Aqua-gym, aqua-stretching: during the training in water, the specific actuating means were used both in the warm-up

part and in the final part of the training, insisting on either the amplitude of the movement or the stretches while maintaining the movement.

2. Methods

The following scientific methods were used in the present research: the study of the specialized bibliography; pedagogical observation; the method of conversation; measurement and evaluation method; testing method; the method of the pedagogical experiment; graphic and tabular method; statistical-mathematical method.

3. Results

The initial and final testing was performed in the gym of the General School No. 19 from Braşov. We mention that before the test, the athletes warmed up the musculoskeletal system. At all the tests, the athletes were explained how to perform the tests and measurements.

Materials needed for testing: centimetre / measuring tape, marking tape, roulette, dynamometer, laptop for recording and tabulation of results.

DYNAMIC FORCE DEXTEROUS HAND AND NON-DEXTEROUS HAND EXPERIMENTAL GROUP

Table 1

Table about the difference between the initial and final averages of DF the dexterous and non-dexterous hand in the experimental group

Time of evaluation experimental group	Average Dynamic force Clumsy hand	Average Dynamic force skillful hand
Initial evaluation	20.5	24.1
Final evaluation	23.5	25.7
Difference in strength The final moment compared to the initial one	3	1.6

DYNAMIC FORCE NON-DEXTEROUS HAND AND DEXTEROUS HAND CONTROL GROUP

Table 2

Table of the difference between the initial and final averages of the DF non- dexterous and dexterous hand in the control group

Time of evaluation - control group	Average Dynamic force Clumsy hand	Average Dynamic force skillful hand
Initial evaluation	19.8	22.1
Final evaluation	21.5	23.7
Difference in strength The final moment compared to the initial one	1.7	1.6

3.1. Interpretation of results

Within the experiment group there is an increase in the difference in the value of the arithmetic average of the force for the non-dexterous hand by 3 kgf between the two tests. At the initial test, the value of the arithmetic average was 20.5 kgf, so that at the final test it reached the value of 23.5 kgf. The value of the arithmetic average of the force for the dexterous hand was 24.1 kgf at the initial test, so that at the final test it reached the value of 25.7 kgf, with an increase of the average of 1.6 kgf.

In the control group, the progress of the

dynamic force in the non-dexterous hand was lower compared to the experiment group with only an increase of the difference of 1.7 kgf, from the initial test of 19, 8 kgf to the final one of 21, 5 kgf. The value of the arithmetic average of the force for the dexterous hand was 22.1 kgf at the initial test, so that at the final test it reached the value of 23.7 kgf, with an increase of the average of 1.6 kgf.

The differences in strength between the right and left arms are still preserved, but there is an improvement in the arithmetic average of the force for the non-dexterous hand in the experimental group.

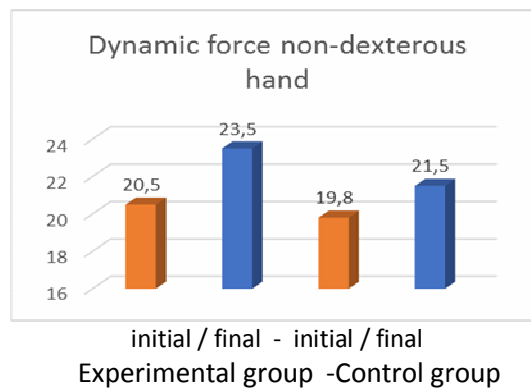


Fig.1. Average dynamic force non-dexterous hand (initial and final) of experimental and control groups

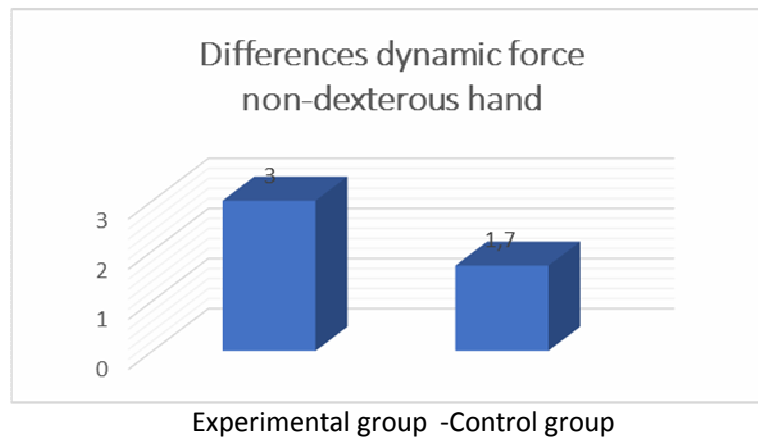


Fig.2. *The differences of the initial and final averages of the DF non-dexterous in the experimental and control group*

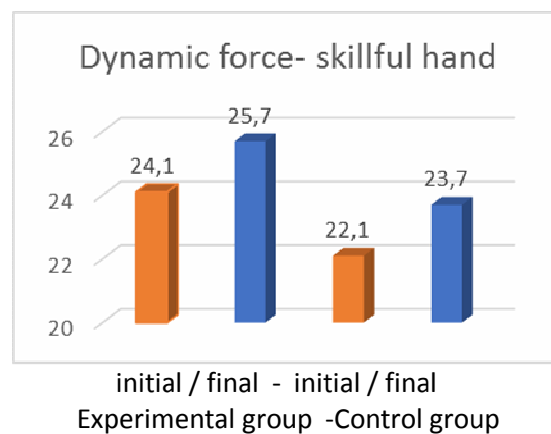


Fig.3. *Average DF skillful hand (initial and final) of the experimental and control groups*

Long spot jump test EXPERIMENTAL GROUP

Table 3

Table of the difference of the initial and final averages at the long jump test on the spot for the experimental group

Time of evaluation - experimental group	Average results for long jump from the spot
Initial evaluation	179.0
Final evaluation	193.7
Different jump	14.7

Long spot jump test CONTROL GROUP

Table 4

Table of the difference between the initial and final averages at the long spot jump test for the control group

Time of evaluation - control group	Average results for long spot jump
Initial evaluation	177
Final evaluation	186
Different jump	9

4. Interpretation of results

The experiment group that carried out the specific activity of aqua-circuit and aquatic plyometrics succeeded in the long spot jump test, an improvement of the difference of arithmetic means by 14.7 cm, this results from the calculation of the difference of arithmetic means between the initial test: 179 and the from the final test: 193.7.

In this test, the control group managed to improve the difference of the arithmetic average by 9 cm, a calculation made by the difference between the initial test: 177 and the final one: 186, according to the data in the table above. The progress of the experiment group is due to the methodology designed and implemented by us that has positively influenced the motor quality of the detent.

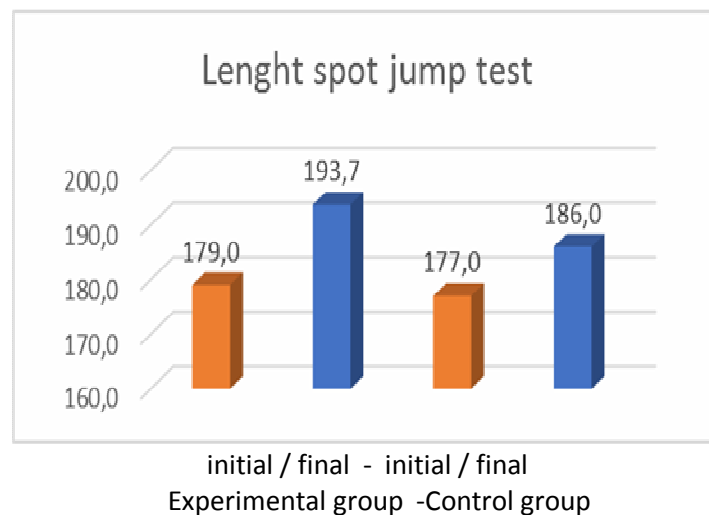


Fig.5. Average length spot jump test (initial and final) of the experimental and control groups

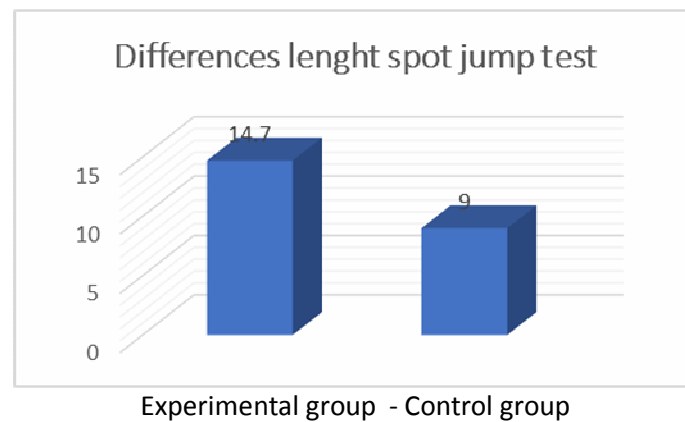


Fig.6. *Differences of the initial and final averages at the long spot jump test to the experimental and control group*

4. Discussions and Conclusions

Following the completion of the experiment, the following conclusions were reached:

- following the research, the main conclusion is that the selection and implementation of aquatic means adapted to puberty and the specifics of the basketball game can determine the optimization of strength for junior basketball players.

The strength in the upper limbs has improved and the difference in strength between the non-dexterous and the dexterous hand has been reduced. The main causes of trauma and posture deficiencies in the pubertal period are also attributed to the uneven development of antagonistic and agonist muscle groups, muscle imbalances of the limbs, poor resistance to stretching and rupture of tendons and ligaments. In this sense, the training methodology must be adapted and developed, taking into account the achievements of modern physiology, the specific features of young athletes and biomechanics and the specifics of basketball.

The positive results were also obtained during the test: long spot jump, following the application of the aquatic plyometry program and the other aquatic means. There is an improvement in the difference in arithmetic means by 14.7 cm in the experimental group compared to 9 centimeters in the control group in this sample.

The methods and aquatic means that we have included in the training program have helped the athletes to reach an adequate physical condition, through attractive aquatic activities that do not demand excessively the muscle- ligaments system of the young basketball player. Using the prophylactic means of swimming, aqua-gym and aqua-stretching help to prevent injuries and leads to a balanced and harmonious physical development.

The conclusion that emerges from the research is that it would be beneficial to continue studying this broad phenomenon, related to changes in somatic, motor and functional, which occur after the use of basketball programs in the training of junior basketball players, in order to optimizing fitness, changing

the training environment, and providing lessons in attractiveness.

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