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CONTRIBUTIONS REGARDING THE IMPROVEMENT OF SPECIFIC PHYSICAL TRAINING IN 14 – 16 YEAR-OLD HANDBALL PLAYERS

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Abstract: *By carefully watching the handball games both in the domestic championship and the games from the World and European Championships, we come to the conclusion that great performances are only achieved by teams that have a very good physical training, so implicitly a general and specific motor ability excellently doubled by a preparation on training factors: technical, theoretical, tactical and psychological.*
The choice of plyometric exercises must imitate handball skills, to maximize the strengthening of the muscles that trigger the movement and, in certain cases, to generate "motor memory", consolidating the technical skills involved.

Key words: *handball, specific physical training, plyometric means.*

1. Introduction

In modern handball, quantitative and qualitative analysis of the game is more and more common. This applies to both top-level games and games played by lower leagues and junior teams. [13], [14]

The process of a team prepares must focused on achievement the game mode to be efficient. All the operations contained in education process: elaboration prospective game model, optimization the base structure of the team, component team, the role and tasks players on posts, collaboration relationship, optimization the education process, and the performance capacities in competitions evaluation, must to go at players preparation in order to grow the performance capacity. [11]

Specialists are monitoring and appreciating the competitive activities of young handball players. The criteria for team management necessitate a suitable approach to each player's role in supporting the team as a whole, as well as the orientation of the training stage. [4]

The transformations in training mean the gradual development, the transition from one stage to another that involves functional, structural and complex psychological changes through the way

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they are combined and through the variety in which they are required in competitions. [7]

Due to the specifics of handball, physical training (multilateral, specific) must be permanently linked to technical, tactical and psychological training, its contribution to consolidating and exploiting the technical-tactical potential being special. [10], [12]

Physical training represents the organized and hierarchical set of training procedures aimed at the development and use of the athlete's physical qualities. It must be constantly manifested at different levels of sports training and serve the priority technical-tactical aspects of the practiced activity. [2]

Future events are impossible to foretell, but for the time being, we can observe many novel aspects of handball that occurred several decades ago, whether they pertain to dynamics, expression, or training. [5]

Specific physical training, through its content oriented towards enriching the specific ability to adapt to effort and the dominant complex motor qualities involved in the practical activity, determines the performance of each handball player [3], [16]

Currently there is a general concern to streamline and modernize game strategies, which lead to the fulfillment of the specific motor capacity in handball players, which can be quantified with the help of verification and measurement indicators (tests and tests specific to this age category) [8], [17], [18].

In addition, in sports training there is a system of pedagogical control, which aims to assess, record and analyze the state of motor functions, mental processes, technical skills, norms of training loads, competitive activities, sports results of those involved and allows to identify and prevent training process deficiencies. [9], [15]

In the game of handball, strength is a primary goal in the training program, as it is related to sprint performance and throwing speed [6], [19].

Refreshing, adapting and modifying the content and usage of various training methods have directly contributed to the improvement of the training process within each training level and competitive age category [1], [20].

1.1. The premises of the work

The importance in training of specific physical training at the age of 14 - 16 years in the game of handball, as well as its use in specific conditions of the game, is the main premise of this thematic research.

In the game of handball, the individualization of training or work on moments and areas of the field is necessary due to the following factors: the fundamental requirements of the game of handball at the level of junior handball players, the demands of the game model, the particularities of the junior player, the level of training and the competition in which she participates, specific game tasks, conditions imposed by the technical management, injuries and illnesses.

It should also be noted the trend of modernization and efficiency of strategies aimed at improving physical condition by introducing computerized materials and technological means and by using complementary sports, aimed at increasing the diversity and complexity of handball players' motor capacity.

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strategies, which lead to the fulfillment of the specific motor capacity in handball players that can be quantified with the help of verification and measurement indicators (tests and tests specific to this age category).

1.2. Research hypothesis and tasks

In order to carry out the experiment, we proposed the following hypothesis:

We assume that through the specific physical training of junior II handball players (14-16 years old) based on independent variables, indestructibly linked to the structure and content of acts, actions and technical-tactical activities, both the technical expression capacity and putting worth of it in the tactical content.

Tasks of the work

Considering the bibliographic research of the game of handball, in the paper we proposed to follow a series of tasks, necessary for the development of our study:

- discovering and structuring bibliographic materials that study the issues addressed in our research;
- highlighting the means of specific physical training applied to junior II handball players;
- the application of the proposed plyometric means to junior II handball players.

The purpose of the work

The purpose of the research is to demonstrate that specific physical training can be achieved by implementing plyometrics, which simultaneously plays the main role in the development of strength and speed.

2. Material and methods

As research methods used in our work, the following were targeted:
the bibliographic study method;

- observation method;
- statistical-mathematical method;
- the experiment method;
- the graphic method.

Organization of research

In order to make our study as efficient as possible, the stages that were covered in our documentation were established from the very beginning:

- January 2022 - March 2022: Study of specialized literature and scientific research in the instructional-educational process

- March 2022: establishment of the premises that generated the purpose and hypotheses of the work.

- March 2022: Goal setting, assumptions and achievable tasks.

- March - June 2022: establishing the proposed training technology to be used.

- August - February 2023: carrying out the actual experiment.

- February-April 2023: Analysis and interpretation of research results.

- April 2023: Formulation of the conclusions and proposals of the work.

In order to highlight the methodological guidelines for specific physical training for handball players of this age group, representative means and training contents were selected and rationalized, considering the introduction of plyometric exercises in sports training and leading to increased efficiency in execution acts, actions and motor activities specific to the game of handball, in order to increase sports performance from the junior level.

The longitudinal experiment took place during the 2022-2023 competitive year and took place in the Slatina Sports Program High School Hall and the Slatina Sports Program High School Gym.

The specific physical training carried out with the help of the proposed programs, was applied for the entire duration of the macrocycle, being present in all phases of the training and having different objectives depending on the time of the training.

In order to obtain a high-level training, I followed the necessary steps to achieve the periodization of the annual plan, but also of the motor skills.

Thus, during the research we used plyometric programs that aimed to increase the maximum speed over distances of 20-30 m, we also had as an objective the quick stop from running (deceleration).

The force was applied during the training primarily through the plyometric method, which focused on reactive power, acceleration power, and deceleration power. Secondly, power and strength training helped the athletes to develop their maximum speed and movement time.

The exercise structures used solved the operational objectives regarding the development of reaction speed, execution speed, acceleration speed and explosive force (mainly of the lower limbs) all performed in combination with technical exercises specific to the game of handball, necessary in consolidating and perfecting the technique basic specific to this sport.

3. Results

Applying in practice the experimental program related to the increase of specific physical training through specialized programs containing plyometric means, the evolution of the motor indicators of the junior handball players (14-16 years old), included in the pedagogical experiment, at the level of the experimental group, was of great interest.

Table 1

Comparative analysis of the level of initial and final specific motor testing of 14-16 year old handball players

Nr crt.	Control norms	TI M	TI CV	TF M	TF CV	t	p
1.	Movement in the triangle	15,366	6,039	14,868	6,167	1,960	significant <0,05
2.	Dribbling between the posts	7,225	8,096	6,843	9,732	2,817	significant <0,05
3.	Throwing the handball ball	25,781	11,035	29,531	8,045	4,049	significant <0,05

The triangle move is another sample under testing. In this test, the tested sportswomen registered at the initial test an arithmetic mean value of 15.366 sec, with a standard deviation of 0.728 and a coefficient of variability of 4.737%, which does not show a high degree of homogeneity at the group level. The best

result achieved was achieved by P.F.C. with a value of 13.2 sec., and the weakest result was obtained by Ş.E.L. and had a value of 16.47 sec. At the final test, the arithmetic mean had a value of 14.868, the standard deviation was 0.717, and the coefficient of variability was 4.822%, which means that it has a high degree of homogeneity.

At the final test, the same athletes as at the initial test obtained the best result (12.9) and the worst (16.09).

Calculating the t-test between the initial and final testing shows us a value of 2.817, which is significant at $p<0.01$.

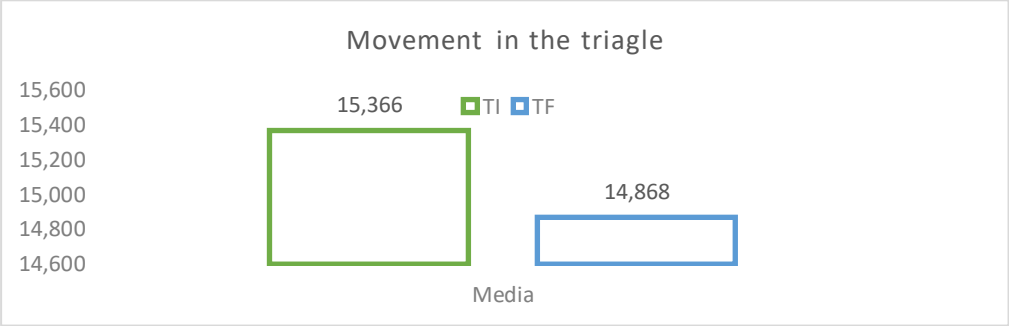

Fig. 1. *Triangle shift test results – arithmetic mean*

In the dribbling test between the goalposts, the experimental team started from an arithmetic mean value of 7.225 sec., the standard deviation is 0.356, and the coefficient of variability is 4.866%, which shows us a group with a high degree of homogeneity. The best result achieved was 6.4 sec. and the weakest had a value of 8.1 sec. The results obtained in the final testing were much better than in the initial testing, so the value of the arithmetic mean was 6.843 sec., the standard deviation was 0.333, and the coefficient of variability was 4.866%, which indicates a group with a high degree of homogeneity.

The value of the "t" test between the two tests was 2.817 which shows us that the differences between the two tests is significant for $p<0.01$.

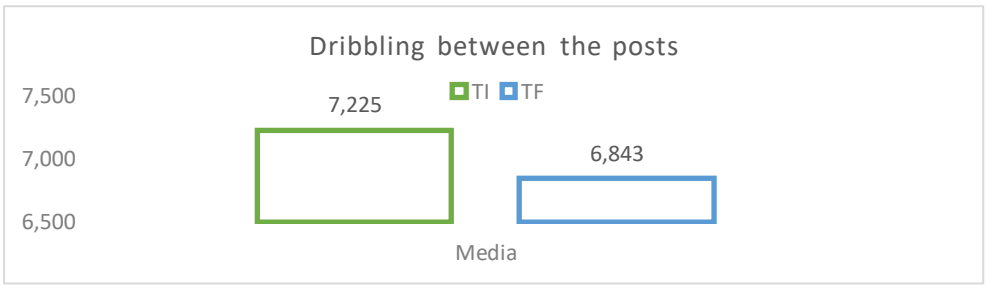

Fig. 2. *Results of the dribbling test between the goalposts – arithmetic mean*

In the "distance handball throw" test, the arithmetic mean value obtained by the 16 sportswomen at the initial test is 25.718 m with a standard deviation of

2.845 and a coefficient of variability of 11.035%, which shows us an average degree of homogeneity. At the final test, the value of the arithmetic mean is 29.531 m, the standard deviation has a value of 2.376, and the coefficient of variability has a value of 8.045%, which indicates the existence of a high degree of homogeneity.

In order to understand the effectiveness of the experimental program, the Student "t" criterion was calculated in order to have a clear vision of the numerical values obtained by the athletes included in the experiment.

The ratio between the initial and final results registers progress, these being significant in the group told the experiment ($P < 0.001$) with $t = 4.049$ in the case of the "handball throwing" test.

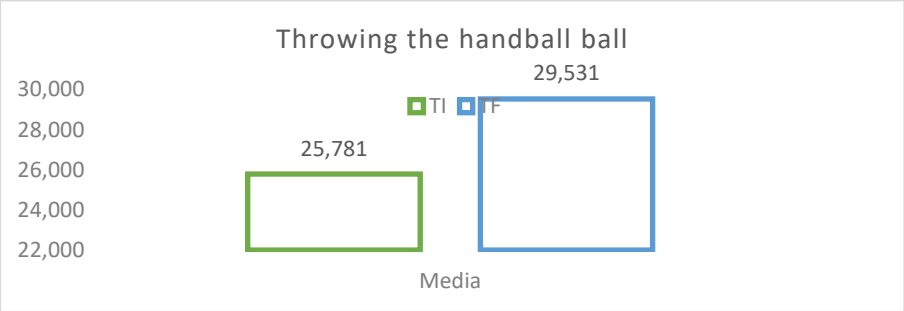

Fig. 3. *Throwing the handball ball – arithmetic mean*

4. Discussions

During the experimental research, the plyometric means of action, customized to the age and training level of the subjects, were composed of exercise structures oriented towards the development of speed and strength.

The exercise structures applied during the experiment mainly had a plyometric content in their composition, but were also combined with technical elements specific to the game of handball. The chosen means were introduced according to the stage of preparation of the experimental group.

In this sense, the training methodology must be adapted and developed, taking into account the achievements of modern physiology, the specific features of female athletes and the biomechanics and specifics of handball.

After the two tests, the experimental group obtained the following performances as follows: the evolution of the indexes in the specific motor tests allows us to observe: in the test moving in the triangle, a progress of 0.498 seconds (from 15.366 seconds to 14.868 seconds); in the dribbling between the goal posts progress was 0.382 seconds (from 7.225 seconds to 6.843 seconds); and in the handball throwing test the progress was 3.75 m.

The values of the "t" test calculated between the performances obtained by the research subjects at the initial and final tests were compared with the value of "t" from Fisher's table, corresponding to the number of cases (in column n-1=15), an aspect that highlights the fact

that in the case of all control samples the differences are statistically significant.

It can be stated that the significant growth shown by the parameters of the experimental group stress the positive effect of the training programme on the qualitative and quantitative improvement of physical strength and specific endurance.

4. 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 plyometric means adapted to puberty and the specifics of the handball game can determine the optimization of strength for junior handball players. Upper limb strength improved and the difference in strength between the non-dexter and dexter hand was reduced. The main causes of trauma and postural deficiencies during puberty are also attributed to the uneven development of antagonist and agonist muscle groups, muscle imbalances in the limbs, poor resistance to stretching and tearing of tendons and ligaments.

For juniors, the dosage of effort must be done with great care, avoiding monotony by using the same training means, as well as their too great diversity, which does not allow correct motor skills to be fixed.

The way in which the specific physical training is approached within the training of a team directly influences the level of technical and tactical behaviour, contributing at the same time to the improvement of the great functions of the body and the morpho-functional indices, establishing conditioning relationships between this and the other sides of preparation.

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