

**PHYSICAL EDUCATION AND SPORTS NATIONAL UNIVERSITY  
PHD AWARDING SCHOOL**

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**ABSTRACT OF THE DOCTORAL THESIS**

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**THESIS TITLE:**

**THE OPTIMIZATION OF THE JUNIOR HANDBALL PLAYERS'  
PREPARATION THROUGH SPECIFIC EFFICIENCY PROGRAMMES  
TARGETED AT SPORTS TECHNIQUE**

The plateau we intend to investigate, the junior level III performance, is situated on the border between hypothetical performance and great performance. The level of the handball players at this stage is a certainty of obtaining further high performance. Having perfectionist purpose, the training aims to benefit from the progress made by fundamental scientific research, impacting on their orientation, training methods and means used. Certainly, accessing knowledge from the biological sciences, psychological, medical informatics, is an inexhaustible source of inspiration, but it also provides a guarantee of training methods rigor to be applied.

The individual or collective sports have achieved outstanding results values in recent decades, specialists accounted for a dynamic factor in finding new ways and means of selection and training of athletes in order to maintain or increase performance.

Choosing the theme is primarily due to my professional concerns, to understand and effectively solve the problems encountered, however, and based on accumulated scientific and methodological knowledge.

Acting as coach at various value echelons of sport performance, we found that athletes constitute a complex entity, with strong psychomotor peculiarities and often contradictory.

Thus, accumulating theoretical and practical experience, but also exchanging opinions with professionals (coaches, teachers, doctors), they confirmed my idea of a difference between athletes, in terms of ability to execute properly a specific technique and particularly in point of their efficiency during the game.

The need to find solutions to streamline the work of athletes, to increase efficiency in preparation aimed at the qualitative component and the temporal learning, motivated me to conceive and realize this approach, wanting to make our

contribution in improving conceptual and practical technical training in the junior level III handball.

## **PRELIMINARY RESEARCH ON IMPROVING EFFICIENT SPORTS TECHNIQUE IN JUNIOR III HANDBALL ATHLETES THROUGH THE APPLICATION OF A TRAINING PROGRAMME ORIENTED TOWARDS IMPROVING THE EXECUTION FAULTS, STIMULATING ATTENTION, MOTOR MEMORY AND REASONING**

The preliminary research aim is, through the approach of science, to select and use a set of training resources, to increase the efficiency of learning the handball technique, but also to check the working means to be applied in the final research.

### **Preliminary research hypotheses**

1. The requirements of the anthropometric model, motor and technical, developed by FRH for juniors III are carried out by two groups included in the survey.
2. The application of work programs aimed at developing motor skills contribute to increasing the performance of junior handball III.
3. Targeting the processes of training and job-specific technical and tactical actions identified as deficient, leading to the improvement of their execution.

### **Preliminary research findings**

The approach made to assess the level of assimilation of junior III technical and tactical baggage, the involvement of attention, reasoning and memory in the effectiveness of executions, the degree of development of motor skills, we can advance the following conclusions:

After the initial testing we note that in the somatic model for the experimental group, the values recorded for the players positions included in our research are close to the greatest extent of the guide inserted in the model developed by the specialized federation. From this perspective we believe that both groups make 2 correctly selected lots, for which data will be removed anthropometric measurements as dependent variables, a part of the first hypothesis formulation is confirmed.

Referring to the motor model, we notice a weaker physical training in the experimental group compared to that of the control one, the deficiencies in some tests may be motivated by the growth spurt of our subjects, but which do not fully justify some underperformance. In the initial testing there are obvious differences between groups. The final testing of these differences is considerably reduced by higher progressions made by the experimental group.

Compared with FRH model requirements, in some of the tests, the scales required are achieved by both groups from the very initial testing, thus for the triangle displacement test- two routes, for the pentajump test imposed by junior II model and the running 5x3m test, progressions could not be significant, even if we have granted attention to the training plans. It seems that in this direction the model could suffer some updates imposed by a younger generation's modified motor potential. For the 30m running speed test the experiment group achieved a significant breakthrough and the control group had higher performance against model from the first test, thus the progression could not have been so spectacular.

In the same note we have also the dribbling between cones and the Cooper test that, though in the initial testing there were no model required values, by the final testing the experiment group takes on average to reach the performance threshold required.

A rather special case is recorded in throwing the handball test where the control group achieved performance above the model requirements from the initial testing, unlike in the experimental group final testing, failing to achieve the average scale required. This is the course of action when the proposed work program will have to register changes to improve deficiencies based on further determination.

For the control group, largely, we can say that there are performance similarities requirements, confirming the first hypothesis model. For the experimental group, if with the initial testing it has not registered similar values for all motor model developed by FRH requirements, partially confirming the first hypothesis, respectively only for certain test mentioned above. The applied program of work led to the improvement of performance and achievement of these design requirements, reducing margins differentiation from the control group thus confirming the second hypothesis. It is necessary that this program proposed to be enhanced to increase performance at steering arm strength on direction explosive force specific throwing motion.

Regarding the technical and tactical handball content compared to the control group and the requirements of the game at this echelon of age, they were identified as less appropriated 4 actions for every phase of the game. Further noting that the difference between the two teams, the experiment group leads in disadvantage for the attack phase of the game, making up for a lowest scoring average, the training programs were oriented to the four technical tactical actions specific to the attack and more to the phase IV, the system game for the players on the semicircle and the field one to be corrected. It was agreed that the program implementation be 15 minutes and be achieved over 4 workouts in a microcycle weekly over 32 weeks.

- The working structures designed both on the motor skills assessment level, on the level of ownership of the technical tactical specific handball baggage and on the basis for determining the quality of attention, memory and reasoning - the mental processes involved in the technique efficacy - led to improving performances especially those involved in the attack phase IV realization, confirming the third hypothesis.

- *In summary:*

- *The motor skills evaluation development provides opportunities for effective technical executions, their loyalty is severely limited by the development of motor skills level.*

- *The anthropometric profile of the subject is similar to the model developed by FRH, with some exceptions regarding body mass experiment group, which exceeds the average value by about 1kg.*

- *The physical preparation of the experiment players finally recorded significant progressions, there are still weaknesses in the upper limb strength, where the values recorded in handball throwing are inferior to the model and the control group results*

- *Technically speaking, there are noticeable differences in learning the handball technique in the experimental group, between groups of players (9 m and semicircle) the difference between it and the control group is obviously decreasing.*

- *The learning level feature offers the possibility of targeting learning and training through the prioritization of specific technical and tactical content structures Phase IV of the attack.*

*The establishment of mental processes quality manifestation, based on tests (attention, memory, thinking), can be the basis of working programs elaboration with an increased degree of objectivity. The application of qualitative structure-oriented exercises for the improvement complements and streamlines the training programs in order to obtain fair and adequate motor responses in game situations.*

### **PART III PERSONAL CONTRIBUTIONS ON THE OPTIMIZATION OF THE JUNIOR HANDBALL PLAYERS' PREPARATION THROUGH SPECIFIC EFFICIENCY PROGRAMMES TARGETED AT SPORTS TECHNIQUE**

#### **- The Research purpose**

After quantifying the effects of the proposed work program in the preliminary research and conclusions, the present research aims to identify, based on data provided by the use of high fidelity technical equipment, drive directions to

increase the performance of athletes in the experimental group, especially showing interest in the upper limb explosive force or throwing motion, in our case the handball. It will also be highlighted the effect produced by applying the proposed programs geared towards improving the shortcomings highlighted and, in this initiative, they will be an integral part of the whole training program for the team, scheduling drives being careful objectified, over the level of physical training and technical and tactical handball players included in the experiment.

### **The research hypotheses**

1. The use of modern investigative apparatus can provide conclusive data to guide training content, especially in the direction of upper limb strength development, specifically for throwing the ball movement.

2. Allocating within the training session economy an expanded segment for the physical training factor, leads to the increase in the junior handball III performance in order to meet for junior FRH II model requirements.

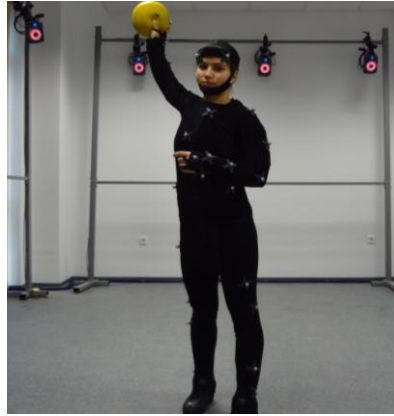
3. The application, in the training programs, of technical and tactical complex structures, oriented towards improving the quality of attention, memory and motor tactical thinking, can greatly improve the players' execution technique performance, the target being the attack phase IV.

The methodology used in implementing the program ideas and conclusions resulted from the preliminary research consisted of:

- Identifying through modern devices (sensors and equipment VICON X-SENS) accelerations at hands' level when throwing the handball to find the force that is printed when discarded;
- Establishing, using and grouping the training means that were awarded with the objectives and tasks of group training;
- Establishment of the way of practical progress; Time 15 min. per training session, conducted in four workouts in a week microcycle, totaling 32 microcycles (December 2013 to May 2014);

Conducting the experimental program has not changed the training structure itself, it was carried on as scheduled according to the workout plan established in each period and stage of preparedness, the author intervention being in the affected program.

Due to poor results recorded in the preliminary research on throwing the handball, we intended to identify the ball throwing force, using X-SENS sensor system. It also recorded the acceleration of the wrist when throwing the handball.



### Conclusions drawn from experiment

1. The evaluation level of motor skills development provides opportunities for effective technical executions; their loyalty is severely limited by the development of motor skills.
2. The anthropometric profile of the subject is similar to the model developed by FRH, with some exceptions regarding the body mass in the experiment group, which exceeds the average value by about 1kg.
3. At the beginning of our research on technical level, notable differences were manifested in acquiring handball technique in the experiment group, between groups of players (9 m and semicircle) the difference between it and the control group obviously decreasing along the research itself, the mean differences being statistically significant at a threshold of  $p < 0.05$ .
4. Targeting the preparation process by prioritizing specific executions resulted in improving the contents of Phase IV of the attack, the attack in the system.
5. The establishment of quality manifestation of the mental processes based on tests (attention, memory, thinking), which formed the basis of the working programs with increased degree of objectivity, has led to significant improvements in the technique of execution and to fair and proper answers in motor game situations.
6. Using high-fidelity technical equipment in assessing dynamic and kinematic parameters when throwing the handball, offered the possibility of intervention in order to improve preparedness. The identification of the hand acceleration via Xsens sensors allowed us the objectification of the training program, identifying thus that the players threw the ball at the moment of deceleration, the throwing force being small, thereby confirming the first hypothesis of the research.
7. The actioning systems that were introduced into the training programs had a custom content in that were folded on determinants influencing the technique appropriation (faithfully executed, attention, memory and thinking) and on the gaps identified in the players during the preliminary research.
8. Following the application - in the experiment group of specific means selected so as to interfere with the efficient preparation stimuli for handball juniors, the objective was achieved - an improvement of specific handball motor skills,

targeting in particular the strength in the arms, displacement speed, driving resistance and coordination, thus confirming the hypothesis 2 research. The effect of the programs applied was a high one, a significant difference between the averages of the two groups, the index Cohen (d) being 0.92 to e the dribbling between cones test, 0.84 to 0.86 in running speed and 10x30m running test, which demonstrates the effectiveness of the means used in the experiment group training.

9. The proven successes that targeted handball throwing accuracy, increased significantly in the final testing for all demarcated areas, especially for those in the top-right of the goal, due largely to the means applied in the workouts in the experiment group focused on arm force development and improving attention, something that has led to improved precision of the players. In the throwing the handball test, the Cohen index (d) of 0.90 indicated a very large effect which is a significant difference between the averages of two groups, the program of work applied on the experiment group, leading to the arms force development.

10. The results of this test are consistent with the data recorded at throwing handball enthusiastically by 3 steps, in which there was a significant progress on the final testing of the experimental group subjects.

11. The assessment of the level of expression of related factors involved in the execution, has enabled the training program to work towards the development of the biomotor potential and the improvement of attention, memory and motor tactical thinking.

12. The work programs implemented which aimed at preparing the technical and tactical performances yielded similar values for all phases of the game, namely improving the initial phase, thus arguing that an intervention-oriented towards the weaknesses of the players found court can greatly improve the shortcomings encountered in the technique of execution is the confirmation of the third hypothesis.

### **General conclusions**

1. The preparedness in the sports training must take into account the provisions of the Handball Federation models that developed specialized training and development trends at international level. In this regard we will have Safi anthropometric model for the current biomotor potential population of our country.
2. Supporting the sports competitions requires a frontal approach of the training factors, especially those tactical-technical and psychological. The thorough specific handball technique learning, since junior age, can secure future performance in the idea that at this level, skills stability is more easily addressed for restructuring.

3. The identification of the gaps in lower echelons of training is becoming a necessity in terms of ensuring a complete technical and tactical baggage for Senior Women.
4. The application of structure-oriented exercises towards the qualitative development of attention, memory and motor tactical thinking is emerging as a necessity, often omitted from preparedness plans, complementary training thus ensuring the increase of the technical and tactical training.
5. The applications of such complex programs forms the basis of tactical thinking and give the players the opportunity to select the most appropriate technological processes according to the situations and conceptions of the game.
6. Designing training programs based on concrete data and evidence provided by specific tests, completed those recorded with cutting-edge technical equipment, providing training objectification of means, giving certainty to the the expected results. This line of work, applied in the sports training since the lower echelons, will give performances with the national championship competitions.

### **Personal contributions and dissemination**

This paper is based on some original approaches, as follows:

- Reconsidering the training programs having in mind the weaknesses identified in the technical execution of processes that have higher frequency of use in handball.
- Developing technical and tactical sets of structures oriented directly to improving executions in the processes identified to be deficient and their inclusion in the general training program.
- Approach the training starting from the models developed by FRH and directing it to the upper echelons models in our case from junior III to junior II.
- Background documents business planning and programming test systems to complement the training profile of handball by data that can reconstruct the original programming activity.
- Using in the practice of sports training of modern technology and data provided by equipment of investigation which is based on complex software in view of concrete objectification and accurate means of training on directions identified to be deficient, an action ensuring the effective management of time spent on the preparation . In this regard, ball throwing motion analysis revealed deficiencies otherwise difficult to identify in terms of both handball movement technique and the use of maximum force on the limit between the acceleration and deceleration speed.