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THE DEVELOPMENT OF STRENGTH CAPACITY IN PERFORMANCE HANDBALL AT THE SENIOR LEVEL

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CONCEPTUAL GUIDELINES OF RESEARCH

Timeliness and importance of the problem addressed

Sport is a specific activity through which the forms of practicing physical exercise are capitalized, in order to perfect the morpho-functional and psychic possibilities, embodied in a record, an overcoming of one's own performance or that of the opponents in the competition.

The specific preparation is carried out within sports training - which is a pedagogical process, carried out systematically and continuously, graded, in order to adapt the body to intense physical and mental efforts, in order to obtain high results in one of the forms of competitive practice of physical exercises [2]. It is the form of organizing the training of specially selected individuals, with special skills, to participate in competitions and obtain maximum results.

The trends in the sports training of senior handball players are displayed by researchers and specialists in the field, having an increased relevance in the approach to the training of athletes.

Aspects of physical training in handball is another important topic addressed in this chapter, a good level of general physical development favors obtaining handball performance.

The basic motor capacity in the training of senior handball players is the force that manifests itself differently and personalized depending on the specificity and particularities of the actions performed. Over time, different techniques for improving strength have been approached and various models for its optimization have been outlined, but nevertheless the subject of strength development is still studied and deepened, constituting a main concern of researchers from field.

Each of the mentioned factors contribute to achieving a high-level sports training when the coach develops and applies appropriate work strategies adapted to the particularities of the athletes and the sports branch.

Physical training is a current topic, being often found in works that deal with topics in the field of sports training. It is present in all stages of sports training, having different weights depending on the established training objectives, the age of the practitioners, their level of training. It is considered that a good physical training is the foundation for the consolidation and improvement of technical training, which in turn conditions the achievement of tactical training. Physical training has as its main objective the development of the basic and specific motor qualities of athletes by using the most effective methods and means of training.

The planning of sports training, therefore also of the physical one, is well outlined in the bibliographic material studied, being also presented staggered models during the training stages from the structure of the annual training plan [4, 5, 6, 10, 11].

Strength is the ability of the individual to make efforts to overcome, maintain or yield in relation to an external or internal resistance, through the contraction of one or more muscle groups [7, p. 235-236]. It is the individual biological and psychological ability to overcome a resistance by

means of muscle contraction [2, p. 126]. The authors Simion Gh., Mihăilă I., Stănculescu G. [13, p. 77] mention the notion of strength capacity, considering that it is the property of the locomotor apparatus to perform muscle contractions to overcome external resistances.

From a theoretical point of view, the problem of strength development is well treated in the relevant literature, both in the works that address the theory and methodology of sports training in a general way, and in those that develop the subject of sports training in the game of handball [5, 9, 10, 11].

In the current game of handball, the specific effort is based on all four motor qualities, which manifest themselves in specific forms, and with regard to strength, it is specified that it is indispensable for the effective execution of the actions specific to the game in attack and defense. The amount of work allocated for physical training (from the perspective of time) for the senior handball teams is around 20% of the total amount of efforts in training. Regarding the specific approach to the training of handball players, there are differences in approach between the Romanian handball school and the other traditional schools that are among the elite of world handball. In the research of the native bibliographic material it is observed that only a small part of it presents information of a practical nature, applied to the realities of the sports training of handball players, compared to the foreign one in which it is better documented and adapted to the specific training conditions.

In the context of the topic addressed, with reference to strength capacity, we can say that in performance sports it is highlighted that the level of strength development influences the degree of manifestation of the other motor qualities, as well as the quality and efficiency of technical-tactical executions, a fact that determines a complex methodical approach to its development. In the game of handball, specialists specify the need to identify the specific forms of manifestation of strength as indispensable, and knowing the relationship of strength with other motor qualities is essential to determine its role and place within general and specific physical training. For practicing handball at a high level, the relationships strength-speed, strength-endurance, strength-skill, strength-mobility are important.

The relationship established between strength and technique depends to a large extent on technique. The selection of contents according to the types of force required in a sports branch must start from the technical actions used by the players. In this sense, instead of the traditional forms of strength-resistance, maximum strength, explosive strength, the specific types of explosive strength in handball are throwing force, fighting force, detachment force and displacement force, so that the work for the development of different forms of manifestation of strength will be addressed directly to the muscle groups involved in performing specific technical actions.

Regarding the relationship of strength with other motor qualities, certain particularities are important for the game of handball. The situations that require the performance of efforts with variable intensity in the performance of specific actions in the changing conditions of the game require the development of the muscle groups that contribute to the execution of technical-tactical actions and require the presence of the strength-speed combination at the level of the upper and lower body, with an emphasis on the shoulder girdle humeral. The form of essential manifestation in the efficient performance of specific actions in the game is strength-speed.

The complex motor quality (strength-speed-endurance) contributes to the effective performance of technical-tactical actions in the game.

Exercising in training the situations that require the presence of the complex of motor qualities strength-skill-endurance has the role of facilitating the performance of technical actions under optimal conditions efficiently and constantly in the game.

The complex of speed-strength-skill motor qualities ensures the motor support for performing fast, efficient and high-intensity technical actions.

Strength is the basic motor ability in the training of senior handball players. In the current game of handball at the senior level, the specific effort is based on all four motor qualities, which are manifested in specific forms, and with regard to strength, it is specified that it is indispensable for the effective execution of the actions specific to the game in attack and defense.

All these forms of manifestation of strength in relation to the other motor qualities must be practiced in preparation alongside the technical-tactical components in order to increase the efficiency of specific actions.

The application of various methodical methods and procedures for the development of the forms of manifestation of strength in the specific context of the handball game must take into account the players' experience, age, individual and development peculiarities, the stage of preparation, the objectives of preparation and performance.

The programs applied for the development of strength must address all the muscle groups involved in the performance of specific technical-tactical actions and contribute to their performance with efficiency in training and competition.

For strength development the age parameter is quite important. In the case of a heterogeneous group in terms of age, specific programs must be created for young players (under 25 years old) with specific objectives regarding the increase of the indices of this motor quality. For players between the ages of 25 and 30, the focus will fall more on maintaining the level achieved and growth on certain components, and for those over 30 years of age, dosage of effort will be considered to maintain the maximum potential reached.

Another important aspect to be taken into account is the specificity of handball playing positions and an adaptation of strength training to the specific technical-tactical content of the position to ensure the optimal development of specific strength indices.

The analysis of the data and information resulting from the study of the documents related to the topic of our work indicates the need for specialists to develop studies and research that address practical aspects of sports training in handball, in general, and that aimed at quality development driving force in accordance with the requirements of the game of handball, in particular. This finding makes the addressed research topic topical and of interest for our field of activity.

Paying special attention to the level of strength capacity development in the game of handball is a natural approach to optimizing this process. The previously supported argument is also doubled by the data obtained in the preliminary research that lead us to the need for a reconsideration of the concept of the game and training at the senior level, as a premise for the realization of a modern and efficient training that can be realized by increasing the level of training and obtaining of superior performance.

The **purpose of the research** was mainly to identify the aspects of physical training specific to the game of handball in the current period, with an emphasis on the development of strength capacity in senior handball players.

The **objectives of the research** were set based on the proposed purpose:

1. Analysis of the theoretical concepts related to the training of senior handball players based on the development of strength specific to the game of handball;

2. Assessment and determination of the level of sports training of senior handball players;

3. Elaboration and application of the content of the experimental program based on strength development, in order to optimize the game performance of senior handball players;

4. Argumentation and experimental verification of the influence of strength development on the optimization of the game performance of senior handball players.

Research hypothesis

The scientific initiative was based on the conception and implementation of a training program containing means adapted to the game model in performance handball at the senior level, which can lead to the improvement of handball players' strength capacity indices.

Research methodology

The realization of the experimental investigation involved the use of specific methods of scientific research such as: studying relevant literature, investigation, observation, samples and tests, experimental, statistical-mathematical, data analysis and interpretation, graphic and tabular.

The **novelty and originality** of the research stand out through the optimization of the strength development program considering the level of development of the strength capacities of

senior handball players. A system of systematized means was designed, which practically demonstrated the importance of its development and its influence on sports performance. At the same time, I proposed the introduction of strength optimization programs in training sessions to improve sports performance.

The **scientific problem of major importance solved** in the research and the theoretical significance consists in optimizing the development of the strength capacity of senior handball players by implementing a strategy for the development of the strength capacity of handball players, systemically integrated in their complex training, which will lead to the development of the athletes' strength and improving performance in the game of handball.

The **applicative value of the work** consists in the fact that the research will have a great practical significance in the training of handball players, being useful to coaches and handball specialists, due to the efficiency proven following the results obtained based on the realization of the experiment.

The essential element for the practical activity is the training models for the development of strength capacity in handball players, elaborated and applied in research.

Approval of scientific results

The results of the conducted research were analyzed and published in several scientific events and in specialized magazines in the country and in the Republic of Moldova, as follows:

- Annales of the "Lower Danube" University, Galați, Romania, 2019
- Annals of "Ștefan cel Mare" University, Suceava, Romania, 2019
- Gymnasium magazine, Bacău, Romania, 2020
- International Scientific Conference "International Scientific and Practical Conference Science, Education, Innovation: Topical Issues And Modern Aspect", Tallinn, Estonia, 2021
- Theoretical-scientific magazine "Science of physical culture", Chisinau, Moldova, 2021
- International Scientific Conference "International Scientific and Conference Science, Education, Innovation: Topical Issues And Modern Aspect", Iasi, Romania, 2021.

1. METHODOLOGICAL REFERENCES REGARDING THE SPORTS TRAINING OF SENIOR HANDBALL PLAYERS

(the basic content of Chapter 1)

The basic task of sports training is "the maximum utilization of the motor skills demonstrated in the direction of the practice of various sports branches" by people endowed with native qualities [12, p. 7].

The purpose of the training sessions "is to increase the effort, performance capacity of the athletes and to develop strong psychological traits" [4, p. 4] that will be useful in the competition.

In all sports games, but especially in handball, there is an increase in the dynamics of efforts, especially pre-competitive ones, which is reflected in the increase in the number of attack and defense actions performed, so that sports training must be carried out at high intensities for to meet the demands.

Sports training has in its structure a series of factors (components) that contribute to solving specific situations from the complex approach to sports training: physical training, technical training, tactical training, psychological training, theoretical training, intellectual training, education [1, 2, 3, 4, 7, 13]. These components should not be seen individually, but as a unitary whole that contributes to the achievement of the objectives of sports training.

Most of the experts, who are concerned with performance handball at the senior level, have turned their attention to the staged organization of the activity, on preparation periods. Thus, a training plan can be divided into mesocycles, microcycles and even the most simplified form, the training lesson. In order to achieve the established objectives, the specialists in the field of handball were concerned with finding an effective balance between the content and the size of the mesocycles, which are made up of several microcycles. A major importance in periodization is also the microcycle, composed in turn, in general, of the sequence of training lessons in a week. Several classifications of microcycles can be distinguished: after the close connection with the team's preparation stage, these microcycles can be named; microcycles of training, pre-competition, competition, compensation, recovery; and according to the training intensity they can be classified; single-peak microcycles, i.e. one high-intensity training session per week; with two or three peaks.

A good physical training of high-performance handball players, together with the native characteristics, ensures an optimal level of development in terms of performance, manifested by speed, strength, relaxation and very good aerobic performance, together with the somatic indices required by the practice of handball during current – taller, stronger, heavier players – to successfully contribute to specific game tasks and integration into the team gear [22].

The training of high-performance handball players must be correlated with the situations encountered in the game and which they must successfully cope with. The most common motor demands in competitions are: high-intensity actions, physical contact and recovery capacity during the game [14].

Physical training, programmed in accordance with the individual characteristics of the athletes, contributes to the development of the motor and physical potential that is decisive in achieving performance, a significant contribution being the strength and power developed in the training context specific to the game of handball. Their development must have an ascending character during a competitive season, having specific phases for development and / or maintenance

with the aim of providing the players with the necessary motor support to obtain an optimal yield in training and competitions [17].

Training for the physical preparation of elite handball players must include means that contribute to the development of strength and power, coordination and specific endurance, agility and relaxation through training with high intensity intervals and short duration (up to 15 seconds), the final effect being visible in the achievement of an optimal level of training that contributes to the fulfillment of the established performance objectives [23].

The role of physical training is to improve the specific physical condition of handball players and to prevent the premature onset of fatigue, especially in tournament-type competitions (World Championships, Olympic Games) where games are scheduled official games every 1-2 days distance for two weeks, in these conditions of increased density of games, the specific physical condition is decisive to have increased efficiency in each game, although the level of fatigue is higher [15].

There is a high correlation between the aerobic capacity of handball players and the efficiency in the game, so it can be stated that the level of aerobic capacity is a predictor of performance in the handball game [21]. The players must cope with the demands of the game during 60 minutes, constantly keeping the same performance of the specific actions performed.

In order to optimize the specific physical condition for the game of handball, the method of high-intensity intermittent intervals should be used together with phases of play in groups of close positions (2 on 2, 3 on 3, 4 on 4). The second variant also brings benefits if it is used during the competitive season, contributing to the increase of cohesion between team members and the degree of coordination of technical-tactical actions, with the aim of optimizing performance from training and competition [16].

The high-intensity efforts required repeatedly during the game gradually and temporarily induce a state of neuro-muscular fatigue, and training will aim to achieve an optimal preparation that delays the onset of the state of fatigue, which has adverse effects on the efficiency of the actions of handball players [20]. The purpose of sports training is to help the athlete reach his maximum potential that he must be able to express in the competition. Reaching the maximum potential has the main benefit of increasing the effort capacity and delaying the onset of fatigue, thus a better performance in training and matches.

The exercises performed in series, as well as those integrated with other means, contribute to the development of the physical condition of the handball players; the first being more often used during the preparatory period, and the integrated ones are specific to the competitive period when they must be correlated with those aimed at technical-tactical training [19].

In addition to the specific training of handball players in order to achieve competitive performances, an important role is played by the anthropometric profile of the players, and falling within the accepted margins for each playing position increases the possibility of efficiently performing the game tasks outlined by the coach [24].

The motor baggage of the high-performance handball player must include elements to be able to achieve a high-quality physical training: very good movement speed, throwing power, relaxation, coordination, agility, general resistance, dynamic balance, precision, mobility, which will be useful in meeting the objectives of training (for the other factors of sports training) and performance.

Physical training in handball is a complex task because it must be planned and correlated with the other sides of sports training (technical, tactical, psychological), the specifics of the playing positions and the individual characteristics of the players to ensure the development of the physical condition at an optimal level.

In the context of the theme addressed, with reference to strength capacity, we can say that in performance sports at the senior level, it is highlighted that the level of strength development influences the degree of manifestation of other motor qualities, such as the quality and efficiency of technical-tactical executions, fact that determines a complex methodical approach to its development. In the game of handball, the specialists specify necessity of identifying the specific forms of manifestation of strength as indispensable, and knowing the relationship of strength with other motor qualities is essential to determine its role and place within general and specific physical training. For practicing the game of handball at a high level, the relationships of the combined motor qualities are important: strength-speed, strength-resistance, strength-dexterity, strength-mobility [18, p. 92-94], but also the complex ones that require the chaining of three or more motor qualities that are decisive in the high efficiency execution of the motor actions specific to the game of handball.

The links that are established between the preparation factors in the implementation of integrated sports training are also highlighted by the connection between the forms of manifestation of strength and the technique of the handball game, the technique being decisive in this relationship. Taking as a starting point the game actions performed by the players during the game, the forms of force manifestation must be identified and developed in the specific context of practicing handball at the performance level. In the preparation process, the methods and means must be chosen that contribute to the optimal development of these forms of manifestation of strength so that the player can reach the maximum level of performance in competitions.

2. ASSESSMENT OF THE LEVEL OF STRENGTH DEVELOPMENT AND ELABORATION OF THE IMPLEMENTATION METHODOLOGY REGARDING THE DEVELOPMENT OF STRENGTH CAPACITY IN SENIOR HANDBALL PLAYERS

(the basic content of Chapter 2)

In carrying out the research, a series of methods were used to determine the way in which the training of senior handball players is carried out, the identification of aspects that can be improved, the application of a special training program in terms of strength capacity in the specific context of sports training in handball, evaluation of training through samples and control tests, analysis of the results obtained [8, p. 222-225].

The realization of the research involved the use of specific methods of scientific research such as:

- studying relevant literature;
- the pedagogical observation method;
- questionnaire survey method;
- samples and control tests;
- the pedagogical experiment;
- the statistical-mathematical method of data processing;
- graphic and tabular method.

We organized and carried out the research activity in optimal conditions, having at my disposal very good material conditions. Two groups of subjects were included in the research: the experimental group, made up of 19 athletes registered with the AHC Dunărea Călăraşi handball team, and the control group, also made up of 19 athletes, handball players from the Politehnica Iași team. The actual training and experiment took place between July 2019 and January 2020.

The research, as a whole, was organized in 3 stages:

Stage I (2017-2018 period) consisting of the activities:

- studying and analyzing relevant literature;
- elaboration of the theoretical and scientific concept of the thesis;
- choosing the physical tests that will be used in the experiment.

The **second stage** (2018-2019 period) contained the following:

- elaboration of an organizational and methodical concept of the work;
- the constitution, development and interpretation of data from the sociological survey;
- elaboration of the experimental program and the theoretical-methodological concept of analytical design of the work.

Stage III (2019-2020 period) includes the following activities:

- the establishment of experimental and control groups and the application of initial tests for their subjects;
- carrying out the actual experiment;
- representation, statistical-mathematical and graphic interpretation of the data and results obtained from the (initial and final) tests performed;
- the elaboration and structuring of the scientific paper, according to the requirements in force.

The questionnaire addressed to the coaches included a number of 17 questions, of which 7 with open answers, and 10 with closed answers, with scaled items (see Appendix 5).

There is a desire to push the physical and biological limits towards unknown areas in the current concerns of handball specialists, with the aim of achieving high performances. Regarding sports performance, we can say that it is an effect of the action of some objective but also subjective factors and should not be treated superficially or left to chance. The organization and planning of the activity play an important role in achieving sports performances. When we have a standard annual plan and implicitly a planning of general and specific physical training that takes place stereotypically and conditioned only by the team's budget or material conditions, it is clear that it cannot present a successful model for obtaining sports performance.

In the present case, the training plan of the experiment group, from the past years, and the current one of the control group, can be characterized as being templated and is structured from: a period of pre-competitive physical training, a competition period and a period of rest. Each stage has its own specifics, for example: the pre-competitive period begins with physical training, without prior testing, with the influence of all motor qualities equally and without a particularization of training and work load; the competitive period is characterized by an emphasis on specific technical-tactical training, and the break period is used exclusively for vacation.

In my program, strength training planning is a basic requirement to maximize strength capacity and is closely linked and correlated with the team's competitive calendar and performance goals and can accommodate adjustments throughout the training process. The goal of optimizing strength capacity in handball is not only to develop strength capacity itself, but is also related to improving muscle strength and endurance, vital components to perform in this sport game.

The main subject of the research is the one related to the strength capacity, which was and remains an interesting topic of debate and is presented in more detail in the previous chapter. In my opinion, strength, as a basic motor quality, is a priority in the game of handball and shows its relevance and importance in all components of sports training.

The development of strength capacity is done during all phases of training, the notion of phasing and periodization appears inherent in this context, and the content used to optimize the

strength capacity of the senior handball players in the group subjected to the experiment was varied, diversified and adapted to each training period (see Appendix 2).

The values obtained by the members of the experimental group, during the initial tests, were used to optimize the strength capacity. This can be done through personalized training depending on the requirements of the playing position, the athlete's medical history and his athletic experience.

Training programming, in the newly implemented plan, starts with the proposed performance objectives and takes into account the competitive calendar in which we find the months of the year that each have a correspondent during the training period, the strength training phases (considered macrocycles), the training weeks (considered microcycles), the training sessions and the macrocycle load model, the detailed presentation of the plan is in Appendix 1.

The competitive year in handball is structured on 2 competitive phases, namely: the championship round and the return of the championship respectively, between the 2 phases there is a competitive break period. This important aspect of running the competition mattered in my decision to plan and organize strength capacity optimization over 2 training cycles.

I present below the training plan of the group subjected to the structured experiment so that optimal results can be obtained (see Appendix 1).

The athletes from the experimental group followed the new training program according to the model presented and included between July 9, 2019 and January 10, 2020, the months of July - January in the competition calendar. Thus, between July 9 and August 31, the months of July and August include the general and specific and pre-competitive training periods, between September 2 and December 15, in the months of September - December, the competitive period takes place, and between December 16, 2019 and January 10, 2020 , the end of December and the beginning of January is the transition period. The evolution of the athletes was a successful one, a fact proven by the results obtained in the competition matches.

3. ARGUMENTATION AND VALIDATION OF THE EXPERIMENTAL DATA ON STRENGTH DEVELOPMENT IN HANDBALL AT THE SENIOR LEVEL

(the basic content of Chapter 3)

The basis and foundation of an optimal sports physical training is the level of development of physical capacities, this is the main reason why we considered it necessary to carry out some tests and for a more faithful assessment of the degree of development of the physical capacities of the athletes. In carrying out the study, I selected two senior male handball teams from Romania and managed to collect a database that could be helpful in this endeavour. Thus, after carrying out the theoretical study on the topic of strength capacity development, we moved on to the application of

physical testing, which is of great importance in the process of physical training specific to the game of handball.

The initial testing period was July 12-14, 2019, Călăraşi, for the experimental group, and August 1-3, 2019, Iași, for the control group, at the beginning of the centralized training of the teams.

The final testing period took place between December 14-16, 2019, Călăraşi, for the experimental group, and December 11-13, 2019, Iaşi, for the control group, before the competitive break.

During the testing period, the teams had the following schedule:

The team from Călăraşi carried out a centralized training program starting from July 9, between 9-14 the program was carried out locally with the following sequence: July 9 team presentation, July 10-11 medical control, July 12-14 physical tests, in between July 15-25 there was a training camp organized in Braşov, Cheile Grădiştei, and in the following period, August 1-24, the program continued with 5 training matches, on August 3, 10, 13, 16 and 17 in the company of different formations (Buzău, Steaua Bucureşti, Focşani) and 3 games played in the "Danube Cup" tournament, organized in Călăraşi on August 22-24. In these 8 matches, 5 wins, 2 defeats and 1 draw result were obtained. The team's schedule, between August 29 and December 12, continued with 14 matches in the Championship and 2 in the Romanian Cup, obtaining in the Championship: 7 wins, 6 defeats and 1 draw, and in the Romanian Cup 1 win and 1 defeat.

The team from Iaşi carried out a centralized training program starting on July 29, between July 29 and August 19, the program took place locally with the following sequence: July 29 team presentation, July 30-31 medical check-up, August 1-3 physical tests , in the following period the program continued with 4 training matches, on August 10, 17, 24 and 31 in the company of different formations (Suceava, Vaslui, Galaţi, Focşani). In these 4 matches were obtained: 1 victory, 2 defeats and 1 draw result. The team's program between September 19 and December 8 continued with 8 matches in the Championship and 1 in the Romanian Cup, obtaining in the Championship: 3 wins and 5 defeats, and in the Romanian Cup: 1 defeat.

Any activity carried out also requires the existence of an evaluation system through which the results obtained can be objectified.

The evaluation was carried out, both as a whole at the level of the entire team, as well as by line of positions (goalkeeper, winger, inter, center, pivot). Each group subjected to the experiment is composed of 19 handball players, with the following composition in the playing positions: wing position - 4, inter position - 7, center position - 2, pivot position - 4, goalkeeper position - 2.

For the athletes selected in this study (control and experiment) I chose to measure and compare the following somatic indices: body height (waist), weight (body mass) and age. I present

the recording, analysis, comparison and graphics of the obtained data, and in Appendix 6 information is presented regarding the subjects of the two groups, participants in the research.

The values obtained by the members of the experimental group, during the initial testing, were used to optimize the strength capacity. This can be done through personalized training depending on the requirements of the playing position, the athlete's medical history and his athletic experience.

Strength training planning is a basic requirement in order to maximize strength capacity and is done in close connection and correlation with the team's competitive calendar and performance goals. The goal of optimizing strength capacity in handball is not only to develop strength capacity itself, but is also related to improving muscle strength and endurance, vital components to perform in this sport game.

The training schedule starts with: the competition calendar, then we find the months of the year that correspond to the training period, the strength training phases (considered macrocycles), the training weeks (considered microcycles), the training sessions and the load pattern of the macrocycle.

The competitive year in handball is structured on 2 competitive phases, namely: the championship round and the return of the championship respectively, between the 2 phases there is a competitive break period. This important aspect of running the competition mattered in my decision to plan and organize strength capacity optimization over 2 training cycles.

The first training cycle was between July 9, 2019 and January 10, 2020, the months of July - January in the competition calendar. Between July 9 and August 31, the months of July and August include the general and specific and pre-competitive training periods, between September 2 and December 15, in the months of September - December, the competitive period takes place, and between December 16, 2019 and January 10, 2020, the end of December and the beginning of January is the transition period.

The development of strength capacity is done during all phases of training, and the content used to optimize the strength capacity of the senior handball players in the group subjected to the experiment was varied, diversified and adapted to each training period.

In order to optimize the training plan, we organized the team of athletes into 3 categories/work groups, depending on the results obtained in the initial tests and also on the individual athletic experience. Each group has specific loads.

Group I was made up of players specialized in the goalkeeper position and young/inexperienced players;

Group II was made up of players specializing in the position of winger and center;

Group III, being composed of players specializing in the position of inter and pivot.

In the anatomical adaptation phase, between July 9-28, corresponding to the period of general and specific physical training, the means used to optimize strength capacity were selected to involve most muscle groups and for the optimal preparation of muscles, joints, ligaments and tendons.

The proposed program includes a large number of exercises, which must be performed comfortably, without the athletes feeling any discomfort. The method applied in this phase was circuit training, which was developed using a wide variety of exercises and equipment such as: your own body weight, TRX (total resistance exercises), heavy balls, light objects, elastic bands, heavy rope, dumbbells, barbells, weight plates, kettlebells, helcometers and other strength training equipment or machines.

During this period of anatomical adaptation, being about senior handball players, mostly with experience, the optimization of strength capacity lasted 3 weeks, the loads used had values between 40-50% of 1RM; the number of stations between 9-10; the number of circuits per training lesson 2-3; rest interval between repetitions, 30-45 seconds; interval between circuits, 2-3 minutes; the total time of a circuit training session, 40-45 minutes; training frequency sessions per week, 3 sessions.

At this stage, great emphasis is placed on the correctness of the execution of the exercises, learning and consolidating the optimal movement technique is very important, a strategic objective for the further evolution of the athlete.

I mention that the testing program was created and structured in three stages of testing, the first testing (initial testing) carried out in July 2019, at the beginning of the teams' preparation, the second testing (intermediate testing) carried out in December 2019, at the end of the first competitive period, before the competitive break period (transition), and the third testing (final testing) held in June 2020, at the end of the regular championship. For objective reasons, caused by the exceptional situation that arose, I was determined to consider the testing from December 2019 as the final testing.

The results obtained in the evaluation samples by groups of positions, respectively team, after the implementation of the experimental force optimization program, were as follows:

The positional composition, in terms of the number of players of the two groups, is similar, a fact that made it possible to carry out the experimental study in optimal conditions.

Within the teams there are differences, and the values obtained in the control samples, in the final testing, by the players of the experimental group are clearly superior to those obtained by the players of the control group.

Table 3.1. Statistical indicators for tests and final results. Intergroup statistical analysis

Group		Speed		Agility Specific	Aerobic resistance	Strength			Strength isometric
		10m sprint (s)	20m sprint (s)	Ilynois test (s)	30/15 sec IFT (km/h)	Half knee flexion	Bench press	Chest lifting exercises	Plank exercises (s)
E	X	1.86	3.09	15.50	19.29	141.47	83.79	42.32	152.11
	S	0.038	0.100	0.438	0.839	12.817	6.989	4.978	26.104
	Cv	2.07	3.24	2.83	4.35	9.06	8.34	11.76	17.16
M	X	1.91	3.17	15.64	18.16	126.42	75.79	34.16	127.63
	S	0.040	0.097	0.467	0.443	10.976	8.324	4.272	27.048
	Cv	2.10	3.06	2.99	2.44	8.68	10.98	12.51	21.19
F(1,36)		14,136	6,007	0,956	27,058	15,119	10,294	29,382	8,054
P		<0,001	< 0,019	>0,335	< 0,001	< 0,001	< 0,003	< 0,001	< 0,007

Table 3.2. Results and final tests. Intragroup statistical analysis. experimental group

Test		Speed		Agility Specific	Aerobic resistance	Strength			Strength isometric
		10m sprint (s)	20m sprint (s)	Ilynois test (s)	30/15 IFT (km/h)	Half knee flexion	Bench press	Chest lifting exercises	Plank exercises (s)
TI	X	1.91	3.17	15.64	18.08	125.11	74.42	33.68	125.53
	S	0.041	0.104	0.469	0.584	11.532	8.990	4.655	28.328
	Cv	2.17	3.27	3.00	3.23	9.22	12.08	13.82	22.57
TF	X	1.86	3.09	15.50	19.29	141.47	83.79	42.32	152.11
	S	0.038	0.100	0.438	0.839	12.817	6.989	4.978	26.104
	Cv	2.07	3.24	2.83	4.35	9.06	8.34	11.76	17.16
F(1,36)		14,540	5,460	1,002	26,672	17,130	12,861	30.470	9,050
P		<0,001	< 0,025	>0,323	< 0,001	< 0,001	< 0,001	< 0,001	< 0,005

Table 3.3. Results and final tests. Intragroup statistical analysis. Control group

Test		Speed		Agility Specific	Aerobic resistance	Strength			Strength isometric
		10m sprint (s)	20m sprint (s)	Ilynois test (s)	30/15 IFT (km/h)	Half knee flexion	Bench press	Chest lifting exercises	Plank exercises (s)
TI	X	1.91	3.17	15.65	18.00	124.32	73.74	33.26	124.47
	S	0.040	0.099	0.468	0.553	10.291	8.608	4.665	27.533
	Cv	2.09	3.10	2.99	3.07	8.28	11.67	14.02	22.12
TF	X	1.91	3.17	15.64	18.16	126.42	75.79	34.16	127.63
	S	0.040	0.097	0.467	0.443	10.976	8.324	4.272	27.048
	Cv	2.10	3.06	2.99	2.44	8.68	10.98	12.51	21.19
F(1,36)		0,030	0,013	0,003	0,945	0,372	0,558	0,380	0,128
P		> 0,871	> 0,908	> 0,959	> 0,338	> 0,546	> 0,460	> 0,541	> 0,723

Following the implementation of the training program and the application of the contents and the use of the proposed means, we obtain at the final tests, at the strength tests: **Half knee flexion**; **Bench press**; **Chest lifting and plank exercises**, the following results, compared to the initial tests, as a whole by the 2 groups and are presented below.

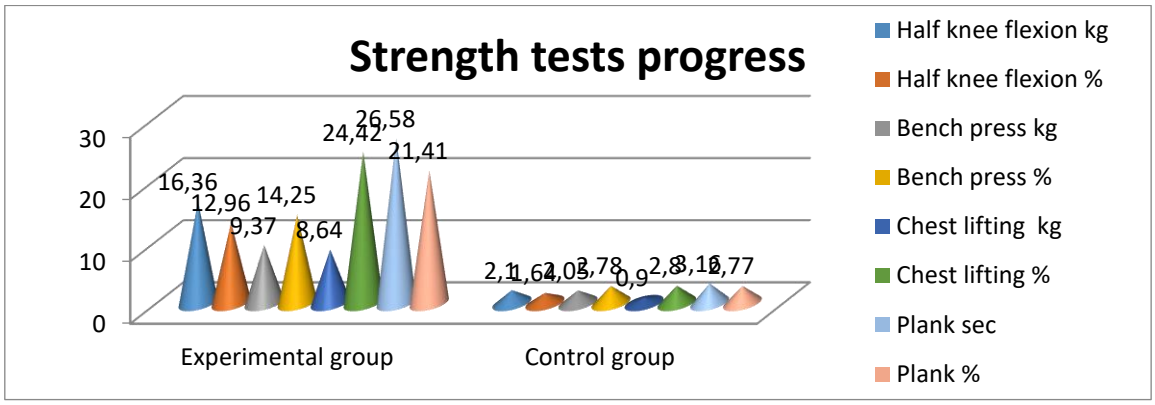

Figure 3.1. The graph representing the overall progress recorded by the two groups in the strength tests at the final testing

After the implementation of the strength capacity development program, overall, the progress of the experimental group was obviously greater than that of the control group.

The intragroup and intergroup statistical analysis from the final testing indicates statistical significance in favor of the experimental group, a fact that confirms the effectiveness of the means used in training, ensuring an optimal framework for obtaining performances in competitions.

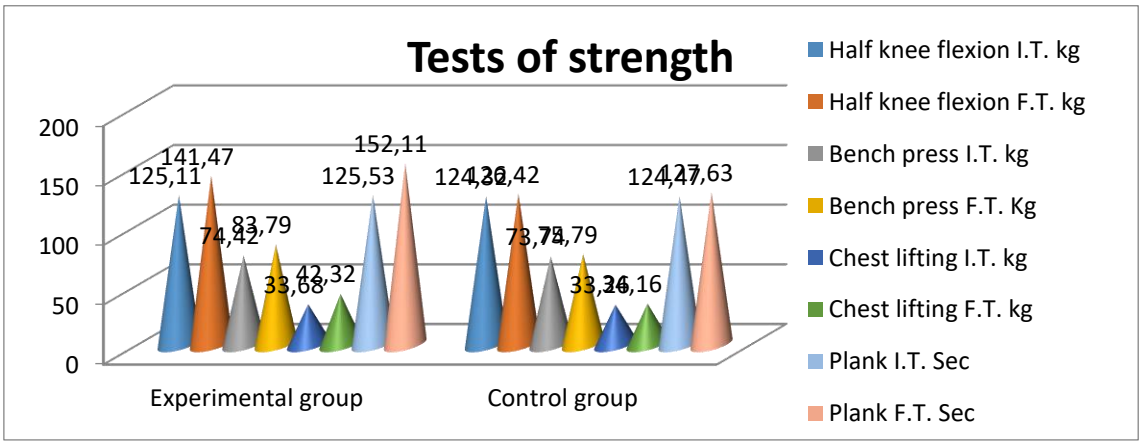

Figure 3.2. Graph representing the results obtained by the two groups at the strength tests, at the initial and final tests

Overall, the average rate of progress in the strength tests, for the experimental group, was 18.26%, and for the control group, 2.49%, during the experimental period. The most important progress was recorded by the experimental group in the strength tests, in **the chest lift** (8.64kg, in percentage 24.42%) and **plank** (26.58 sec, in percentage 21.41%), following the **bench tests**

(9.37kg, in percentages 14.25%) and **Half knee flexion** respectively (16.36kg, in percentages 12.96%).

The results of the final tests, regarding the running tests: 10 meter sprint; 20 meter sprint; Ilynois and 30/15 IFT, recorded by the 2 groups as a whole, compared to the initial tests, are presented below.

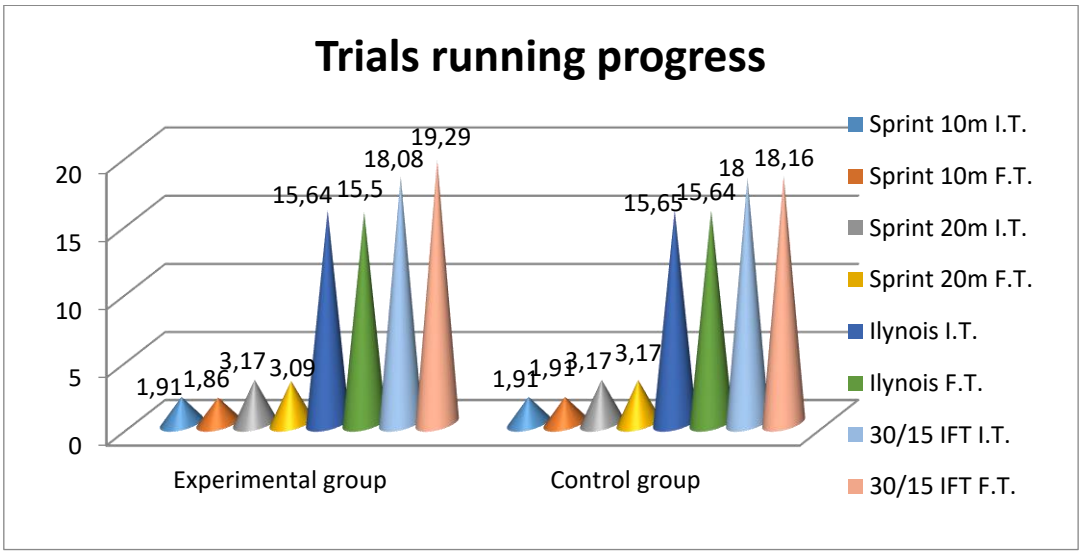

Figure 3.3. The graph representing the results recorded by the two groups in the running tests at the initial and final testing

Overall, the average rate of progress registered by the experimental group was 0.09 sec, in percentage 3.18%, and in the control group the progress achieved was only 0.003 sec, in percentage 0.24%, after the period subjected to the experiment. The most important advances were those registered by the experimental group in the running tests, 30/15 IFT (1.21 km/h), in percentages 6.69%, and sprint 10 meters (0.05 sec), in percentages 2 .62%, following the 20-meter sprint tests (0.08 sec), in percentages 2.52% and respectively in the Ilynois running test (0.14 sec), in percentages 0.9%. In the control group, the only significant progress was in the 30/15 IFT running test (0.16 km/h), in percentage 0.89%.

Including the running tests, compared to the control group, the progress of the experimental group was higher, after the period subjected to the experiment.

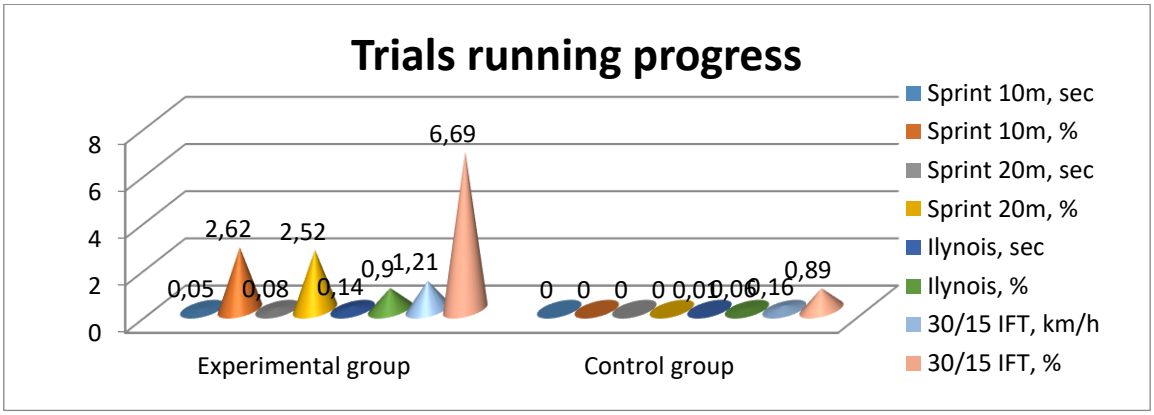

Figure 3.4. The graph representing the overall progress made by the players of the two groups in the running tests at the final testing

As a result of the application of the means presented in the training program of the experimental group, a real increase in the motor indices was highlighted. At the final testing, both in the strength tests: half knee flexion; bench press; chest lifting and plank exercises, as well as running tests: 10 meter sprint; 20 meter sprint; Ilynois and 30/15 IFT, the recorded results were significantly in favor of the experimental group (16.36 kg; 9.37 kg; 8.64 kg; respectively 26.58 sec), in the strength tests, (0.05 sec; 0.08 sec; 0.14 sec; respectively 1.21 km/h), in the running tests. Comparing the results obtained by the experimental group at the final test with those of the control group, it can be concluded that the exposed means have demonstrated their effectiveness, having an increased influence in the development of strength capacities, in all their forms of manifestation.

A good physical preparation is an extra step towards performance, and the success or failure of a coach is also due to the quality of the human material he trains.

In general, the coaches mainly insist on the development of the motor qualities as a whole, the development of the strength specific to the effort in the game of handball being treated superficially.

The process of optimizing the development of strength capacity is a complex one, because, within the handball game, it must be correlated with aspects related to the athlete's somatic, motor, psychological typology and the technical-tactical content of the game. The relevance of this process is given by the level of the athlete's morpho-functional development, but especially by its valorization in its subsequent sports evolution. In the course of this approach, objective or subjective situations may arise that can alter the predictions of specialists demonstrated by scientific data.

The process of developing the strength capacity for the game of handball extends over a long period and contains the aspect of continuity in order to be efficient in achieving sports performances.

The major differences observed in the analysis of the final tests, between the two groups, are mainly due to the modality and means used by the athletes in the experimental group. In the case of strength exercises, the large increase is also explained by the relatively low level from which the athletes initially started. The systematic work and the consistent work done within the strength capacity development program has as a consequence the increase in muscle quality and obviously superior results in the competition.

The important achievements obtained during the research are expressed primarily through the aspect of physical integrity, the athletes not having any serious injuries during this period, and the good sports results obtained in team competitions stand as proof, thus validating the qualitative aspect of the development of strength capacity.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

Specialists in the field of sports, in general and handball, in particular, emphasize the importance of physical training, stating that this is one of the main factors in sports training, the basis and indispensable support of technical-tactical achievements, on which sports training is based, influencing performance in training and competitions, being the connecting element for the other training components.

In the context of studying the specialized literature regarding the planning of specific means in the training of senior handball players, I had the opportunity to obtain relevant information for a good understanding of the methodology of applying the effort parameters, in different stages of training. At the same time, in the studied bibliographic sources there are examples of the application of specific means with the aim of influencing the optimization of the development of the specific force in the training process.

Achieving sports performance is largely conditioned by training at a high and superior quality level, for each component of the training. The identification and application of objective tests to correctly determine the level of development of each motor quality for each individual game position, as well as for the other components of the training, is essential in achieving a high-level training and achieving performances in competitions. The need for periodic testing of the players' strength development indices is essential to obtain a concrete answer to the sports training activity carried out, but also to be able to adjust any deviations along the way.

In order to improve the training system of performance handball players, it is necessary to develop and implement in practice a training methodology aimed at developing the specific strength of handball players at the senior level.

The methodology for developing the strength capacity specific to the game of handball at the senior level must have a well-defined place, with objectives that can be met in order to increase the performance potential and obtain the desired results.

The positive evolution of the strength capacity parameters in the athletes of the experimental group in all the strength tests used (which involve the muscle groups used in practicing the handball game) as a consequence of the application of the training plan and validates the correct and optimal choice of the means used.

The training plans and the planning of the physical training sessions determined an increase in the development of the general and specific strength capacity of the handball players subjected to research in the experimental group, which confirms the good implementation of the plan to optimize the development of strength capacity. The athletes included in the control group reported a relative and insignificant evolution from the point of view of strength development. An increased level of strength capacity development, through specific forms of manifestation, is essential in the current handball game and provides the prerequisites for obtaining sports performance.

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1. For an effective development of the strength capacity of senior handball players, it is recommended that the coach, physical trainer deepen the specialized materials, with the aim of selecting the most suitable methods and means.

2. It is recommended to use strength training planning, which contains exercises and close structures from the game of handball with the purpose of increasing strength capacity.

3. The effective organization of the strength development program as an integrated part of the specific training lesson with senior handball players, influences the increase of strength specific to the handball game.

REFERENCES

1. ALEXE, N. Antrenamentul sportiv modern. București: EDITIS, 1993, p.531, p. 64-68. ISBN: 9735824914.
2. ALEXE, N. Teoria și metodica antrenamentului sportiv modern. București: Editura Fundației "România de mâine", 1999, p. 28-30. ISBN: 973-582-139-7.
3. BALINT, E. Bazele teoretico-metodice ale antrenamentului în jocul de handbal. Brașov: Universitatea Transilvania, 2006, p. 52-64, 88-95, 200-212. ISBN: 973-653-810-0.
4. BOMPA, T. Periodizarea. Teoria și metodologia antrenamentului. București: Ex-Ponto, 2002, p. 5-10. ISBN: 9736440966.
5. BOTA, I. Modele de joc și pregătire. București: Sport-Turism, 1984, p. 21, 203.
6. COLIBABA-EVULEȚ, D., BOTA, I. Jocuri sportive, teorie și metodică. București: Aldin, 1998, p. 187-195, 201-224. ISBN: 973-98005-4-8.
7. DRAGNEA, A., TEODORESCU, S. M. Teoria sportului. București FEST, 2002, p. 608-610, 354-362, ISBN:973-85143-3-9.
8. GAGEA, A. Metodologia cercetării științifice în educație fizică și sport. București: Ed. Fundației România de Mâine, 1999, p. 46-78.
9. HANTĂU, C. Handbal. Buzău: Alpha MDN, 2000, p.61-73. ISBN: 9786065055537
10. KUNST – GHERMĂNESCU, I., GOGÂLTAN, V., JIANU, E., NEGULESCU, I. Teoria și metodica handbalului. București: Sport-Turism, 1983, p. 54-62, 79, 105.
11. MIHĂILĂ, I. Evaluarea în selecția și pregătirea handbaliștilor de performanță, Universitatea din Craiova. Craiova, 2006, p. 25, 41-56, ISBN: 973-742-366-6.
12. ȘICLOVAN, I. Teoria și metodica antrenamentului sportiv. București, C.N.E.F.S., 1984.
13. SIMION, GH., STĂNCULESCU, G., MIHĂILĂ, I. Antrenament sportiv, concept sistemic. Constanța, Editura Ovidius University Press, 2011, p. 47-48, 53, 72, ISBN: 978-973-690-894-1.
14. BARBERO, JC., GRANDA-VERA, J., CALLEJA-GONZALEZ, J., DEL COSO, J. Physical and physiological demands of elite team handball players. International Journal of Performance Analysis in Sport, 2014, Vol. 14, No. 3, p. 921-933, ISSN: 2474-8668.
15. CARDINALE, M., WHITELEY, R., HOSNY, AA., POPOVIC, N. Activity profiles and positional differences of handball players during the World Championships in Qatar 2015. International Journal of Sports Physiology and Performance, 2017, Vol. 12, No. 7, p. 908-915, ISSN: 1555-0265.
16. DELLO IACONO, A., ELIAKIM, A., MECKEL, Y. Improving fitness of elite handball players: small-sided games vs. high-intensity intermittent training. Journal of Strength and Conditioning Research, 2015, Vol. 29, No. 3, p. 835-843, ISSN: 1064-8011.

17. GORSKI, M., STARCZEWSKI, M., PASTUSZAK, A., MAZUR-ROZYCKA, J., GAJEWSKI, J., BUSKO, K. Changes of strength and maximum power of lower extremities in adolescent handball players during a two-year training cycle. Journal of Human Kinetics, 2018, Vol. 63, No.1, p. 95-103, ISSN: 1640-5544.
18. LEUCIUC, F.V., PETRARIU, I., PRICOP, G., ROHOZNEANU, D.M., POPOVICI, I.M. Toward an Anthropometric Pattern in Elite Male Handball, International Journal of Environmental Research and Public Health, vol. 19, no. 5, 2022, 2839, eISSN 1660-460.
19. MIRZAEI, B., RAHMANI-NIA, F., MEHRABANI, J., ZIKSARI, MS. Effect of serial and integrated concurrent exercise on selected physical fitness factors of young men handball players. Medicina Dello Sport, 2013, Vol. 66, No. 1, p. 47-59, ISSN: 0025-7826.
20. POVOAS, SCA., ASCENSAO, AAMR., MAGALHAES, J., SEABRA, AFT., KRUSTRUP, P., SOARES, JMC., REBELO, ANC. Analysis of fatigue development during elite male handball matches. Journal of Strength and Conditioning Research, 2014, Vol. 28, No. 9, p. 2640-2648, ISSN: 1064-8011.
21. TOSUN, GT., KOC, H., OZEN, G. The Relationship between aerobic capacity and match performance in team-handball. Kinesiologia Slovenica, 2017, Vol. 23, No. 3, p. 5-11, ISSN: 1318-2269.
22. WAGNER, H., FUCHS, PX., VON DUVILLARD, SP. Specific physiological and biomechanical performance in elite, sub-elite and in non-elite male team handball players. Journal of Sports Medicine and Physical Fitness, 2018, Vol. 58, No. 1-2, p. 73-81, ISSN: 0022-4707.
23. WAGNER, H., GIERLINGER, M., ADZAMIJA, N., AJAYI, S., BACHARACH, DW., VON DUVILLARD, SP. Specific physical training in elite male team handball. Journal of Strength and Conditioning Research, 2017, Vol. 31, No. 11, p. 3083-3093, ISSN: 1064-8011.
24. ZAPARTIDIS, I., KORORIS, P., CHRISTODOULIDIS, T., SKOUFAS, D., BAYIOS, I. Profile of young handball players by playing position and determinants of ball throwing velocity. Journal of Human Kinetics, 2011, Vol. 27, p. 17-30, ISSN: 1640-5544.

List of author's publications on the topic of the thesis

Timofte M. Evaluarea condiţiei fizice a handbaliştilor seniori = Assessment of the physical condition of senior handball players. In: Știința culturii fizice, nr. 37/1, 2021, p. 89-98. https://doi.org/10.52449/1857-4114.2021.37-1.07

Timofte M., Leuciuc F. Toward a strength training approach at male handball players. În: SPORT AND SOCIETY Interdisciplinary Journal of Physical Education and Sports, Volume 21, Issue 2, 2021, 7 p. https://doi.org/10.36836/2021/2/33

Timofte M., Leuciuc F. Aspects concerning men's handball players preparation in the opinion of the coaches. *In:* Gymnasium, Scientific Journal of Education, Sports and Health, vol. 21, no 1, 2020, p. 104-116. https://doi.org/10.29081/gsjesh.2020.21.1.08

Timofte M., Leuciuc, F. Characteristics of the handball game at the senior's level in the current time period. In: Annals of "Dunarea de Jos" University of Galati. Fascicle XV, Physical Education and Sport Management, vol. 1, 2019, p. 46-49. https://doi.org/10.35219/efms.2019.1.10

Timofte M., Leuciuc F. Considerations Regarding Physical Training In Handball. In: The Annals of the "Ştefan cel Mare" University, *Physical Education and Sport Section*, The Science and Art of Movement, volume XII issue 1, 2019, p. 125-133.
https://annals-fefs.usv.ro/revista/considerations-regarding-physical-training-in-handball/

Leuciuc F.V., **Timofte M.,** Ciubotaru M., Andrei I. Studiu privind eficiența acțiunilor de joc ale echipei naționale a României la Campionatul Mondial de Handbal Feminin, Germania 2017 = Study on the efficiency of the game actions of the Romanian national team at the Women World Handball Championship Germany 2017. În: Ştiinţa culturii fizice, nr. 30/1, 2018, p. 52-57.
http://scf.usefs.md/PDF/Revista%20SCF/1--2018.pdf

Timofte M. Aspecte privind pregătirea handbaliștilor seniori în opinia jucătorilor. În: Sport. Olimpism. Sănătate: Congresul Ştiinţific Internaţional, Ediţia a V-a (10-12 septembrie 2020). Chișinău: USEFS, 2021, p. 437-443.

ANNOTATION

Timofte Mihai ***"The development of strength capacity in performance handball at the senior level":*** PhD Thesis in Educational Sciences. Chisinau, 2022

Structure of the thesis: Introduction, 3 chapters, conclusions, bibliography 219 sources, 10 appendices, 135 pages of basic text, 36 figures, 11 tables. The obtained results are published in 8 scientific papers.

Keywords: handball game, strength, performance, power, sports training, periodization, optimization, physical development, motor training, means system.

The **purpose of the research** is to identify some aspects of the physical training specific to the game of handball in the current period, with an emphasis on the development of strength motor skills and to establish the theoretical-methodological foundations regarding the development of strength capacity in the performance handball game at the senior level.

Research objectives:

1. Analysis of the theoretical-methodological and scientific conceptions of the game of handball at the senior level.

2. Appreciation of the level of strength capacity development and its influence on performance in the handball game.

3. Elaboration of the experimental model for the development of strength capacity in the game of handball.

4. Experimental argumentation of the effectiveness of the development of strength capacity at the senior level in the performance handball game.

The **novelty and originality** of the research consists in the optimization of the physical training process taking into account the current level of strength capacity development at the senior level in the performance handball game.

We developed a network of systematized means, which practically demonstrated the importance of developing this strength capacity and its influence on performance in the handball game. I also proposed to include the means of developing the strength capacity specific to the game of handball in the annual training system, strength being of major importance for this sport.

The **scientific problem** of major importance solved in the research consists in the optimization of the strength capacity development system by implementing a systematized and staged program for the development of specific strength capacity for handball, which will lead to an improvement of sports performance in the game of handball at the level of seniors.

The **theoretical significance** of the study consists in the development and implementation of a program for the development of strength capacity, which aims to improve the sports performance of the handball game at the senior level.

The **applicative value** of the work consists in the fact that the results obtained in the research can be used as methodical benchmarks by physical trainers and performance handball coaches in sports clubs.

ADNOTARE

Timofte Mihai „*Dezvoltarea capacităţii de forţă în handbalul de performanţă la nivel de seniori*”: Teză de doctor în științe ale educației. Chișinău, 2022

Structura tezei: Introducere, 3 capitole, concluzii, bibliografie 219 surse, 10 anexe, 135 pagini text de bază, 36 figuri, 11 tabele. Rezultatele obținute sunt publicate în 8 lucrări științifice.

Cuvinte-cheie: joc de handbal, forţă, performanţă, putere, antrenament sportiv, periodizare, optimizare, dezvoltare fizică, pregătire motrică, sistem de mijloace.

Scopul cercetării este de a identifica unele aspecte ale pregătirii fizice specifice jocului de handbal în perioada actuală, cu accent pe dezvoltarea aptitudinii motrice forţa şi de stabilire a fundamentelor teoretico-metodologice privind dezvoltarea capacității de forţă în jocul de handbal de performanţă la nivel de seniori.

Obiectivele cercetării:

1. Analiza concepțiilor teoretico-metodologice și științifice ale jocului de handbal la nivel de seniori.
2. Aprecierea nivelului de dezvoltare a capacității de forţă și influența ei asupra performanţei în jocul de handbal.
3. Elaborarea modelului experimental de dezvoltare a capacităţii de forţă în jocul de handbal.
4. Argumentarea experimentală a eficienței dezvoltării capacității de forţă la nivel de seniori în jocul de handbal de performanţă.

Noutatea și originalitatea cercetării constă în optimizarea procesului de pregătire fizică luând în considerare nivelul actual de dezvoltare a capacității de forţă la nivel de seniori în jocul de handbal de performanţă.

Am elaborat o reţea de mijloace sistematizate, care a demonstrat practic importanța dezvoltării acestei capacități de forţă și influența ei asupra performanţei în jocul de handbal. De asemenea, mi-am propus includerea mijloacelor de dezvoltare a capacității de forţă specifice jocului de handbal în sistemul de pregătire anual, forţa având o importanță majoră pentru această ramură sportivă.

Problema științifică de importanță majoră soluționată în cercetare constă în optimizarea sistemului de dezvoltare a capacității de forţă prin implementarea unui program sistematizat şi etapizat de dezvoltare a capacității de forţă specifice pentru handbal, care va conduce la o îmbunătăţire a prerformanţei sportive în jocul de handbal la nivel de seniori.

Semnificația teoretică a studiului constă în elaborarea și implementarea unui program pentru dezvoltarea capacității de forţă, care vizează îmbunătăţirea prerformanţei sportive a jocului de handbal la nivelul seniorilor.

Valoarea aplicativă a lucrării constă în faptul că rezultatele obținute în cercetare pot fi folosite în calitate de repere metodice de către preparatorii fizici şi antrenorii din handbalul de performanţă în cadrul cluburilor sportive.

АННОТАЦИЯ

Тимофте Михай «*Развитие силовых способностей в гандболе высших достижений на уровне сениоров*». Диссертация на соискание степени кандидата педагогических наук. Кишинэу, 2022.

Структура диссертации: введение, 3 главы, выводы, библиография – 219 источников, 9 приложений, 135 страниц основного текста, 36 рисунков, 11 таблиц. Полученные результаты опубликованы в 8-ми научных статьях.

Ключевые слова: гандбол, сила, высшее достижение, мощность, спортивная тренировка, периодизация, оптимизация, физическое развитие, двигательная подготовка, система средств.

Цель исследования состоит в выявлении некоторых аспектов специальной физической подготовки в гандболе на современном этапе, с акцентом на развитие силовых способностей, и в установлении теоретико-методологических основ развития силовых способностей в гандболе высших достижений на уровне сениоров.

Задачи исследования:

1. Анализ теоретико-методологических и научных концепций в гандболе на уровне сениоров.

2. Оценка уровня развития силовых способностей и их влияния на достижение высоких результатов в гандболе.

3. Разработка экспериментальной модели развития силовых способностей в гандболе.

4. Экспериментальное обоснование эффективности силовых способностей спортсменов высших достижений в гандболе на уровне сениоров.

Научная новизна и оригинальность исследования заключается в оптимизации процесса физической подготовки с учетом современного уровня развития силовых качеств гандболистов-сениоров.

Была разработанна сеть систематизированных средств, которая показала на практике значимость развития силовых качеств и их влияние на достижение высоких результатов в гандболе. Также предполагалось включить средства развития силовых способностей, характерных для игры в гандбол, в системе годового цикла подготовки, так как сила в данном виде спорта играет основную роль.

Значимая научная проблема, решенная в исследованиях, состоит в оптимизации системы развития силовых способностей в гандболе путем внедрения систематизированной поэтапной программы развития силовых качеств в гандболе, что приведет к улучшению спортивных достижений гандболистов-сениоров.

Теоретическая значимость исследования состоит в разработке и внедрении программы развития силовых качеств, ориентировнную на совершенствование спортивных результатов у гандболистов-сениоров.

Практическая значимость работы заключается в том, что результаты, полученные в исследовании можно будет применить в качестве методических ориентиров тренерами по физической подготовке и по гандболу высших достижений в рамках спортивных клубов.

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THE DEVELOPMENT OF STRENGTH CAPACITY IN PERFORMANCE HANDBALL AT THE SENIOR LEVEL

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