

**NATIONAL SPORTS ACADEMY  
„VASSIL LEVSKI“  
DEPARTMENT „BASKETBALL, VOLLEYBALL, HANDBALL “**

**GEORGI IVANOV PETROV**

**MANAGEMENT OF THE TRAINING PROCESS DURING THE  
PREPARATORY PERIOD OF ELITE MALE VOLLEYBALL  
PLAYERS**

**AUTHOR’S SUMMARY**

**of dissertation**

**FOR AWARDING THE EDUCATIONAL AND SCIENTIFIC DEGREE  
“Ph.D.”,**

**professional field 7.6. Sports, doctoral program “Theory and methodology of  
sports science”**

**SCIENTIFIC SUPERVISOR:**

**Assoc. prof. Vera Antonova, Ph.D.**

**Sofia, 2022**

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The doctor's theses cover 196 standard pages. It is illustrated by 11 tables, 43 figures and a list of literature made use of. Bibliography contains 147 sources, out of which 133 are in Cyrillic alphabet and 13 in Latin alphabet, one from Internet.

Numbering of the tables and figures in the abstract coincides with the one in the doctor's theses.

The doctor's theses have been discussed and directed for public defense before a scientific jury at expanded meeting of the "Basketball, volleyball, handball" department of "Vassil Levski" National Sports Academy, held on March 9, 2022.

The public defense of the doctor's theses for conferring the title of "PhD" educational and scientific degree shall be held on June 2, 2022 at 13.00 hours at "Franz Bekenbauer" hall of "Vassil Levski" National Sports Academy, Student's town, Sofia.

## **INTRODUCTION**

Topicality of the studies related to improving the sport mastership of elite male volleyball players during the preparatory period is due to many factors, but the achievement of optimal indicators in the combination of the physical abilities and the technical skills is of special importance. That fact predetermined the search of new perspective approaches towards the management of the educational and training process, allowing more rational use of the physiological potential of the volleyball players.

Active searches are done now of the ways for increasing the effectiveness of the volleyball players' competitive activity by developing the structure of identifying the specificity of the technique-tactic content in attack and defense. Finding ways of increasing their effectiveness, ways for the formation of space-time orientation when performing technical skills providing high quality performance of complicated techniques.

The application of various forms of organizing the volleyball training sessions is one of the perspective directions for improving the sport preparation system of the elite volleyball players, contributing for activation of the intellectual and motive activity of the players, increasing their psycho-emotional state and decreasing the muscle tension. The development of appropriate programme of motive acts is of great importance for activating the intellectual and muscle activity. The increase of the technical and tactical readiness indicators is determined by the ability for operative and logical thinking, timely objective evaluation of the situation and effective solving of tactical tasks having arisen unexpectedly. That sets up high requirements towards the development of the psycho-physical qualities whose balanced level defines the exactness of the motive actions.

The theoretical and practical importance of the study stays in the fact that its results add the management of elite volleyball players' teaching, based on improving the technical preparation via formation of skills for programming the motive actions to the section of the theory and methodology of the sport training. The structure content was disclosed during the process of managing the technical methods, which made possible the formulation of concrete tasks, the choice of effective means and methods, providing the development of algorithms for performing technical actions.

## **I. SET UP OF THE PROBLEM**

Pertinence of the study is defined by the following contradictions in the management of the training process during the preparatory period of elite male volleyball players:

- between the necessity of improving the effectiveness of elite volleyball players' competitive activity and the insufficient knowledge of the problem for the management, identification and application of ways for increasing the level of the technical and tactical readiness as a way for activating the intellectual and motive activity;
- between the constant increase of the requirements towards the technical and tactical preparedness of the elite volleyball players and the lack of development of the abilities in the technical skills.

These contradictions allowed the formulation of the research problem: theoretical-methodological management during formation of abilities for managing the parameters of the motive activities in the process of the conditioning and technic-tactic preparation of elite volleyball players during the preparatory period.

The great volume of training and competitive load exert considerable physiological influence on the function of the inner organs (metabolism, blood circulation, breathing, secretion, etc). Data about volleyball players' weight changes within the process of important competitions speak about that. Average loss of weight after such competitions is about 1,5 - 2,5kg. The great energy consumption allows to count in the load of the players to a load of sub-maximal power.

It is known that sport development leads to training of many years, related to the incessant increase of the requirements during training and competitions. An athlete can reach the execution of these requirements in two ways: to increase the

outside parameters of the load – its general and particular volumes, intensity while performing the exercises, etc., which leads to respective changes and following restructuring in the morpho-functional systems of the body; the other way is to make use of measures and procedures directly referring these systems, complicate or ease their activities (pharmaceutical products, masks, baric chambers, etc).

Sport theory studies show that the general many-sided training, developing the physical qualities of the athletes, has positive effect on the increase of their sport results. Anyway, by the increase of the sport mastership level, its share in achieving sport results gradually declines. In that respect, the percentage of the general and specific physical condition gradually (with the increase of the sport mastership) changes in favor of the specific (Ilynich, 2002; Yu. Kuramshin, 2004).

Management of the sport training appears in 1950 and has been formulated as scientific concept by L. Matveev (1964). It contains compulsory part in planning the training for the preparation of elite teams. As a whole, the theory for the periodization and management is based on periodical changes, composed of all biological and social manifestation of man. Regularity and periodic changes occurring in the structure and the content of the training process during the time under the effect of the training load are the essence of the periodization.

Management is directly related to the regularity of the sport form development. The state of training periods appears as objective regularity not only thanks to the biological prerequisites but because of the periodic changes in the structure and content of the training process too as needed condition for the sport perfection. The laws of sport training periodization are first of all laws for the management of the sport form phases. According to V. Platonov (2013) there are specific and general didactic principles in the system of periodization: seal to high results, deep specialization, unity of the general (fundamental, base) and specific

preparation, uninterrupted training process, unity of the gradual increase of the load and the tendency to maximal load, wave-like and variety load, cycles in the process of preparation, unity and inter-relation in the structure of the of competitive activity and structure of preparedness, unity and inter-relation of the training process and the competitive activity, out of training factors, inter-relation of the preparation process with prophylactics of traumatism and illnesses, didactic principles and their use within the system of the athlete's preparation.

Management, in its most general form, can be defined as arrangement of the system, i.e., taking it in correspondence with the objective laws, active in the field. The management of the system, the counteraction to the factors of disorganization influencing it, is performed by natural means and mechanisms, inherent to the system itself. In that relation, the dynamic system acts as self-managing system, containing two sub-systems – managed and managing, forming together the system of management. The purpose of the training process management is to optimize the system for the wholesome readiness of the athlete, to develop his preparation level guaranteeing the achievement of the highest sport results.

As shown by the analysis of the literature sources and the personal experience in the training process, practically there is no scientifically reasoned methodology about a long term training process in school and methodological instructions, programmes for the education and improvement of the technic and tactic as well as their management during the preparatory period of elite men volleyball players. For the time being, the necessary distribution of time is not calculated for the elite players to optimize the volume and intensity during the separate micro-cycles, the general and specific condition, the transfer and transformation of the physical qualities into technical skills, tactical and technical preparation, control of the training and competitive activity.



On the bases of all said in the theoretical analysis and the personal competitive and coaching experience, we have formulated our **working hypothesis** as follows:  
*the application of specific overall training programme during the preparatory period of elite male volleyball players, shall increase the level of their specific workability.*

## II. PURPOSE, TASKS, METHODOLOGY AND ORGANIZATION OF THE STUDY

The *purpose* of the present study is to increase the specific workability of elite male volleyball players by applying an overall training programme based on changes in the quantitative and qualitative correlation of the work done during the preparatory period.

We have set up the following *tasks* for the realization of the purpose:

1. Analysis of the state of the problem under study according to literature data.
2. Analysis of the planning of elite male volleyball players' preparation during the preparatory period on the base of the sport-pedagogical experience.
3. Working out a training programme directed to the development of the specific workability of elite male volleyball players during the preparatory period.
4. Studying and analyzing the average values and variety of the indicators for elite male volleyball players.
5. Study and analyses of the degrees of dependence between the anthropometric, motive and technique-tactic indicators.
6. Establishing the factor structure of the indicators under study for the elite male volleyball players.
7. Sport-pedagogical experiment for establishing the effectiveness of the specific training programme.

*Object* of the study is the specific training programme directed to the development of specific workability of elite male volleyball players.

*Subject* of the study is the specific workability of elite male volleyball players during the preparatory period.

Fifty male volleyball players from 4 elite clubs of the Russian and Bulgarian championship have been researched (“Lokomotiv” – Novosibirsk, “Pirin” – Razlog, “MarekUnion-Ivkoni – Dupnitsa, “Zenit” – Kazan).

The experimental group enters 12 competitors from “Lokomotiv” team – Novosibirsk, prepared according to specific training programme directed to increasing the level of the specific workability during the preparatory period.

The control group enters 11 competitors from “Zenit” team – Kazan, carrying out their preparation according to a Russian programme (methodology).

Additionally, 27 competitors from two Bulgarian clubs – “Marek Union-Ivkoni” (Dupnitsa) and “Pirin” (Razlog) have been tested. These two teams carry out their preparation according to Bulgarian programme (methodology). They went under sport-pedagogical tests too. The results are enclosed for extracting a factor structure for elite male volleyball players.

**Research methods:** Study and analysis of informational resources; Inquiry study; Sport-pedagogical tests; Sport-pedagogical experiment; Structure organization of the sport preparation of elite male volleyball players during the preparatory period.

We have established the momentary (starting, base) structure state of the anthropometric, physical, technical signs and qualities of the elite male volleyball players; their development during the preparatory period is followed up. The following requirements have been taken in mind for the selection of the indicators: to bear information about the development of the various motive qualities and technical skills; to have proved reliability; validity, accessibility, objectiveness and standard; to be applicable to terrain conditions. The anthropometric data are presented in (table №4).

### *Physical development indicators*

**Table №4 Physical development indicators**

<b>№</b>	<b>Indicators</b>	<b>Measure unit</b>	<b>Measurem exactness</b>	<b>Direction of increase</b>
<b>1</b>	High reach with one arm extended	sm	1,0	+
<b>2</b>	High reach with two arms extended	sm	1,0	+
<b>3</b>	Body mass	kg	0,1	-/+
<b>4</b>	Body fat	%	0,1	-/+
<b>5</b>	Muscle mass	%	0,1	+/-

Ten indicators (**table №5**) have been used for studying the physical preparedness of the competitors, providing information about the speed, strength, endurance, jumping ability, suppleness and dexterity of the competitors.

### *Physical preparedness indicators*

**Table №5 Physical preparedness indicators**

<b>№</b>	<b>Indicators</b>	<b>Measure unit</b>	<b>Measurem exactness</b>	<b>Direction of increase</b>
<b>6</b>	Abdomen press	number	1,0	+
<b>7</b>	Vertical jump standing – touching with both hands (blocking motion)	sm	1,0	+
<b>8</b>	Vertical jump with run up – touching with one hand (spiking)	sm	1,0	+
<b>9</b>	Throwing medicine ball with a step and jump	sm	1,0	+
<b>10</b>	Throwing medicine ball sitting	sm	1,0	+
<b>11</b>	Throwing medicine ball standing	sm	1,0	+
<b>12</b>	Specific speed	sec	0,01	-
<b>13</b>	Jumping endurance	number	1,0	+
<b>14</b>	Evaluation of HR recuperation	index	0,1	-
<b>15</b>	Diving with one arm forward	sm	1,0	+

Nine indicators have been used for studying the technique-tactic preparedness of the competitors (**table №6**).

**Table №6 Indicators for technic-tactic preparedness**

<b>№</b>	<b>Indicators</b>	<b>Measure unit</b>	<b>Measurem exactness</b>	<b>Direction of increase</b>
<b>16</b>	Setting	number	1,0	+
<b>17</b>	Passing	number	1,0	+
<b>18</b>	Jump float	number	1,0	+
<b>19</b>	Spiking by directing the ball to zone №1	number	1,0	+
<b>20</b>	Spiking by directing the ball to zone №5	number	1,0	+
<b>21</b>	Spiking from zone №6 (pipe)	number	1,0	+
<b>22</b>	Tip behind the block	number	1,0	+
<b>23</b>	Receiving from service machine	number	1,0	+
<b>24</b>	Block between balls	sec	0,01	-

### **Differences between the applied methodologies**

A range of quantitative and qualitative indicators in the various aspects of the preparation and the state of the athlete, provision of successful activity or achieving of the planned competitive result in the chosen form of sport serving for selection of athletes and management of the education in the training process are understood as model characteristics in the theory of sport. Indicators of the model in that case act as referential values of the criterion for effectiveness on the base of which the execution of various training systems, where by regulating the load, purposefully may be used means for selected impact on the development of the physical abilities and technique-tactic skills.

As known, the following components should be taken in mind for the planning and control of the physical load: length of the exercise, intensity of the exercises, length of the rest intervals, the nature of the rest, number of repeating the exercise, coordination complexity of the exercise, number of players participating in the exercise. **Table №7** shows the structural differences of the model characteristics

between the Unified volleyball programme and the Experimental training programme during the preparatory period.

While educating speed-strength abilities, it is necessary to take in mind the interaction of the exercises from various directions because if a wrong sequence of performing the exercises is chosen, the final result of the education might be opposite to the planned one. The positive interaction in the psycho-motoric is manifested if the training session covers:

***Table №7 Differences in the model characteristics between the Unified programme and the Experimental training programme***

UNIFIED PROGRAMME	EXPERIMENTAL PROGRAMME
<b>Preparatory period</b>	
General preparatory General and specific physical preparation 60% Technical 30% Tactical 10%	General preparatory General and specific physical preparation 50% Technical 50% Tactical -%
Specific preparatory Specific and general physical preparation 40% Technique-tactic 50-55% Theoretical 5-10%	Specific preparatory Specific and general physical preparation 40% Technique-tactic 50-55% Theoretical 5-10%
Pre-competition: Specific physical preparation 10-15%	Pre-competition: Specific physical preparation 20-30%
<b>Strength</b>	
At the beginning the exercises are performed in slower tempo, with greater rest interval. Further the speed of performing is increased on the account of the length of rest. “Up to refusal” Method	TEMPO: CONTROL-PAUSE-EXPLOSION DOZE: 50%-60%-70%-80% from 1 RM 6 - 6 - 6 - 6 repetitions REST: 60 – 90 sec.
<b>Speed</b>	
Athletics-temp run. Length of the exercises – up to 20 sec. Sport games – football, basketball, etc. Method – variable, basketball, etc. Methods – variable.	Athletics – acceleration (nonlinear). Length of the exercise –up to 8 sec. Lack of sport games. Intermittent load.
<b>Endurance</b>	
Other sports – cross, cycling, rowing, swimming and sport games. Weights –waistband, bags full of sand, Methods – steady, circular.	Means should correspond to the bio-chemical and anatomical-physiological particularities upon developing the efforts in the basic motive habit.
<b>Suppleness</b>	
Active, passive	Dynamic
<b>Technical preparation</b>	

Technical skills 3-4 times more than the one during the game	Technical skills 1-3 times more than the one during the game
<b>Servicing – as a team</b>	
Number of the mistakes under 8% as a team	Number of the mistakes under 15% as a team
<b>Receiving</b>	
Preciseness 80-90%	<b>Preciseness</b> 50-60%
<b>Blocking motion</b>	
Passive and active. From standing position folding and unfolding joints. Successful blocking above 45%.	Active. From standing position unfolding joints. Successful blocking above 25-30%.
<b>Training means</b>	
Dynamic exercises (working in groups) 5-70% of the training session. Preparatory exercises; basic exercises, games	Exercises directed to perfecting certain elements, performed by maximum efforts through competitive-game method.

- At the beginning speed-strength (with alactate-anaerobe energy provision) and after that exercise for speed endurance (with anaerobe-glycolytic energy provision);
- First speed-strength exercises and after that “general” endurance (aerobe exercises) too;
- First exercises for speed endurance and after that for “general” endurance.

Transfer and interaction can be called a process where the increase of the presentation upon performing certain exercises or tasks is reflected on the result in other exercises or motive tasks. Of course this problem is exceptionally important both for the theory of education and for the practice of using the transfer for developing physical qualities in the motive skill education.

A range of factors which change the development of the volleyball game require a change in the management approach of the training process of elite man volleyball players. Model characteristics in volleyball have changed within the time from predominantly strength-endurance to speed-strength nature. The basic factor limiting the technical skills is the nerve-muscle specificity of the movement technique in volleyball. In order to achieve maximum positive transfer of skills, the exercises should be closely related to the coordination scheme of the game. That is

why a positive transfer (i.e. positive effect for improving the technique of the movements) is provided by comparatively small number of exercises. Table №8 demonstrate the essential differences in the training programme probated by us, showing flexibility and actuality in the management of the training process in comparison with confirmed and proved methodologies.

*Table № 8 Description of the differences between the applied methodologies*

	<b>UNIFIED programme</b>	<b>RUSSIAN programme</b>	<b>EXPERIMENTAL programme</b>
<b>Methods for developing the motive qualities</b>	Steady, repeated, changeable, circular, interval, game, competitive	Steady, repeated, changeable, circular, interval, method of great efforts, game, competitive	Repeated, interval-changeable, game, competitive
<b>Methods for developing the technical skills</b>	Explanation, demonstration, correction of mistakes, analyses, technical means.	Studying – in parts and wholly	Full learn
<b>Methods for developing the tactical actions</b>	Studying – in parts and wholly, analysis of the actions.	Studying – in parts and wholly, analysis of the actions	Studying – by parts and wholly, analysis of the actions, intellectual preparation
<b>Intensity (energy provision)</b>	Average (aerobe) High (anaerobe)	Average (aerobe) High (anaerobe)	High (anaerobe)
<b>Intensity (technique-tactic)</b>		13-14 attacking strikes in a minute – <b>high</b> 6-7 attacking strikes in a minute - <b>average</b> . Less than 6-7- <b>low</b>	6-7attacking strikes in a minute - <b>high</b> Less than 6-7- <b>average</b>
<b>Intensity (pulse)</b>	Up to 140 - <b>low</b> Up to 160 – <b>average</b> Up to 180 – <b>high</b>	Up to 140 - <b>low</b> Up to 160 – <b>average</b> Up to 180 – <b>high</b>	Up to 140 - <b>average</b> Up to 160 – <b>high</b>
<b>Volume – by week</b>	24-26 hours	24-26 hours	17 hours
<b>Structure of the training session</b>		Sequence: Tech-tac preparation; Speed; Dexterity; Strength; Specific endurance	Sequence: Parallel and wave-like development of the qualities, technique and tactic
<b>Concluding part of the training session</b>		Gradual decrease of load. Stretching.	Concluding by high intensity. Stretching.
<b>Length of the training</b>	One session per day 120-180 min		One session per day 120-150 min



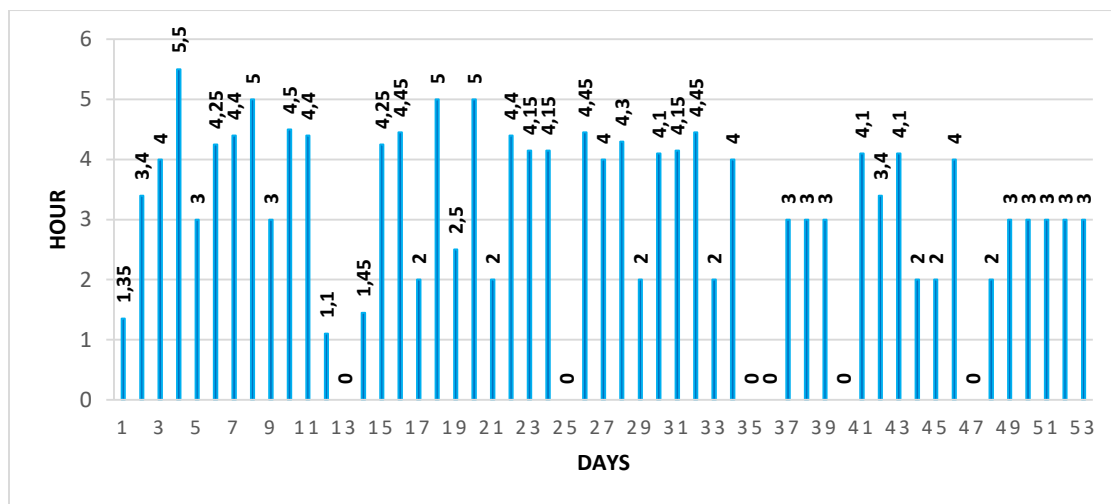
	Two sessions per day 2 x (120-150 min.)		Two sessions per day 2 x (90-140 min)
<b>Recuperation</b>		sauna	Ice bath

The great competition in modern volleyball requires training processes realized by most modern methodologies and permanent updating by scientifically reasoned quality additions. Elite volleyball players are comprehensively developed athletes possessing strength and speed endurance, explosive strength, jumping ability, suppleness and skills for correct orientation in a complicated game situation for a short period of time. Elite male volleyball player plays in more than 60 matches per year, the average length of a match is 1.30 hours during which everybody performs between 80 and 130 maximal jumps, up to 500 technical skills realized in various situations. The basic methodological and managerial problem related to the building up of the training process, its periodization ensues from here. And more concretely, during the preparatory period – finding the respective optimum between the target tasks related to the sport calendar and the real adaptation abilities of the organism and their realization (**table №9**).

***Table №9 Distribution of the volume in the training sessions of “Lokomotiv” team – Novosibirsk***

Preparatory period			
	General preparatory		Specifically preparatory
Mezzo cycles	General – base one	Specific – base one	Pre-competitive
Micro cycles	1	5 (3:1)	3
Days	12	21	16
Quantity of training sessions	12 training sessions	40 training sessions	15 training sessions
Volume	43 hours	62 hours	63 hours
General physical preparation	15 hours	20 hours	16 hours
Specific physical preparation	9 hours	8 hours	8 hours
Integral preparation	17 hours	33 hours	40 hours
Participation in tournaments			5

**Fig. №3** points out the general volume of training sessions in hours



**Fig. №3** Everyday volume of training sessions in hours

The experiment lasts within the frames of the preparatory period in 2017.

The following mathematic-statistic methods have been used for the procession of the results: *Frequency analysis*; *Variation analysis*; *Correlation analysis*; *Comparative t-criterion of Student* for dependent and independent extracts; *Factor analysis*.

### III. ANALYSIS OF THE RESULTS

#### III.1. ANALYSIS OF THE INQUIRY RESULTS RELATED TO THE PLANNING OF THE ELITE MALE VOLLEYBALL PLAYERS PREPARATION

Inquiry study is a part of the researches for perfecting the structure of the sport preparation of elite male volleyball players during the preparatory period. An inquiry card has been produced for the purpose which has been discussed and edited in advance as it is used for the first time.

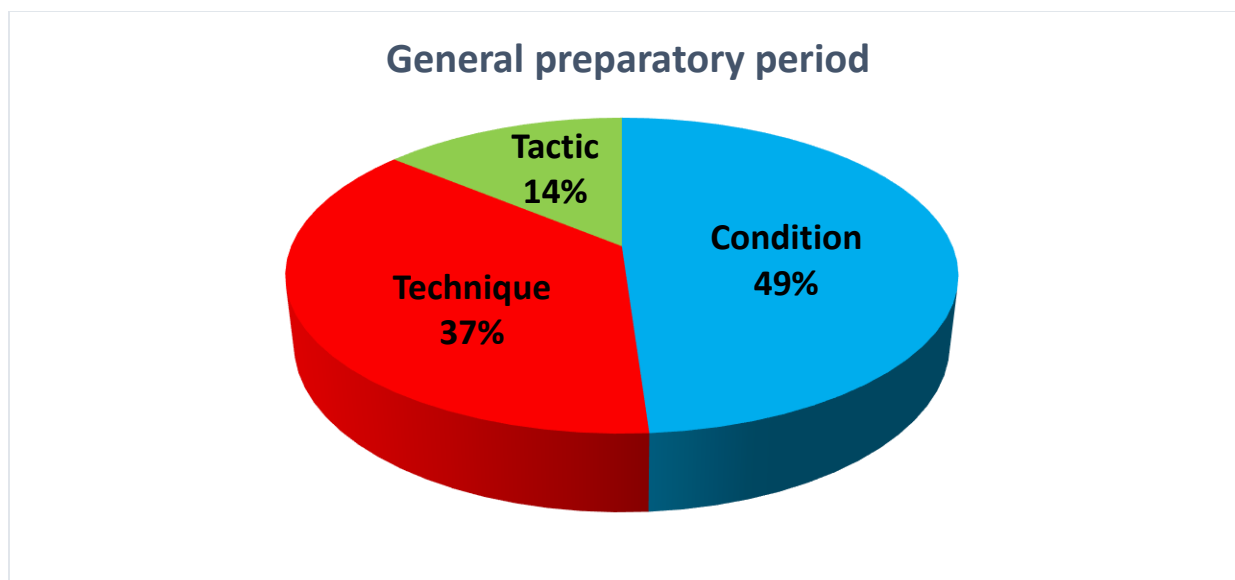
The purpose of the study is the generalize the standing points of leading experts and coaches in the National Super League, having experience in working both with male and female competitors.

The coaches have in mind many factors when answering the question – what base the training plan is developed on (**fig. №10**). In narrow meaning, planning of the training sessions means first of all tasks, content, organization and methods of education.



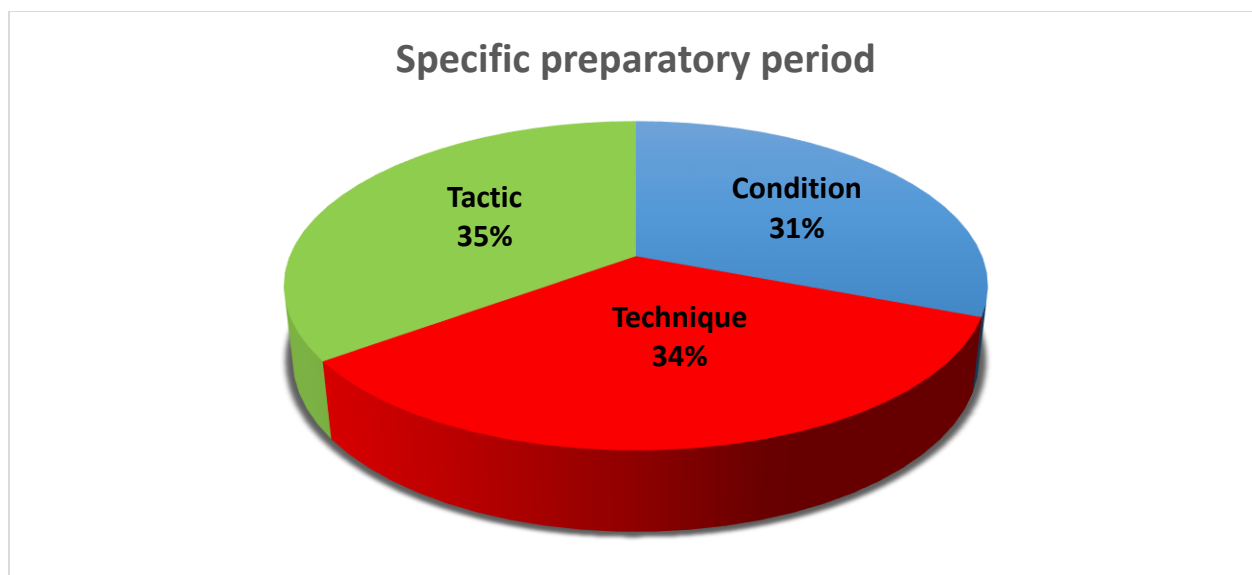
***Fig №10 Bases for developing the training plan.***

The question related to the percentage correlation of the separate sides of the sport training during the preparatory period is divided into two parts. The first one covers the general preparatory period (**fig. №11**). Its priority, as pointed out by the experts, is the condition preparation (49%). The physical fitness problem is based on the concept for the motive skills or motive abilities of the volleyball player.



***Fig. №11 Correlation of the separate parts in the sport preparation during the general preparatory period***

The second part of the question relates to the percentage correlation of the separate sides of the sport training during the preparatory period, namely during the specific preparatory period (**fig. №12**). The coaches have considerably decreased the condition share in the training process. It is (**49%**) during the general preparatory period while during the specific preparatory period it is already (**31%**) from the complete time of the training. During the general preparatory period, condition has accumulating (stock up) effect while during the specific preparatory one it is of transforming ((conversion) effect reaching the level of its realization. That is why its relative share is considerably decreased.

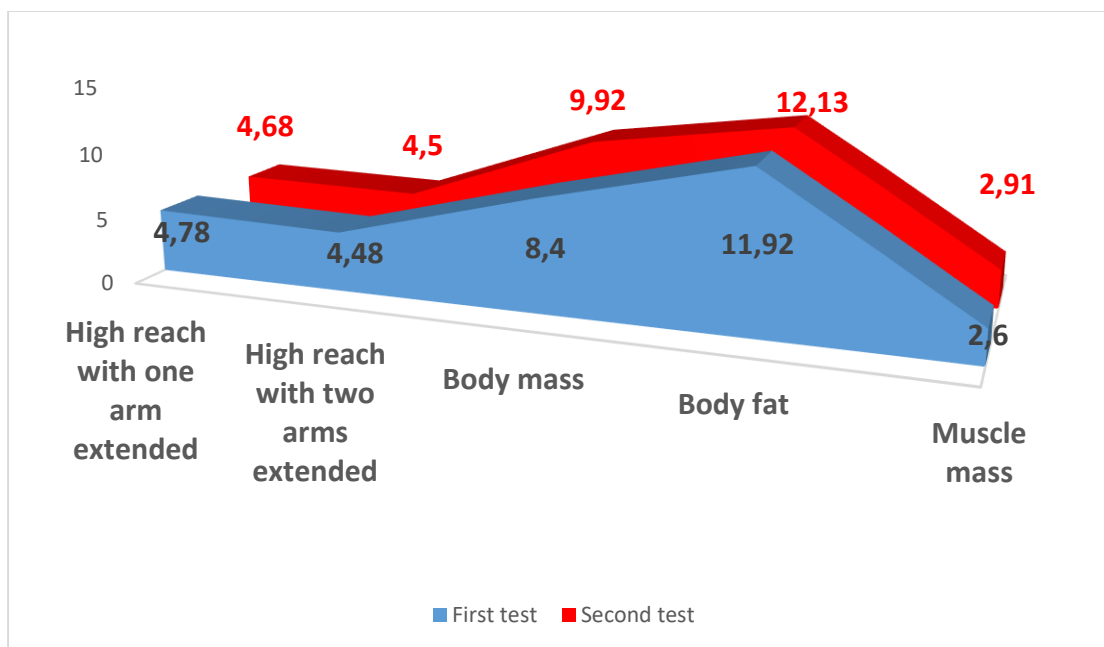


*Fig. №12 Correlation of the separate sides in the sport preparation during the specific preparatory period*

### **III.2. ANALYSIS OF THE AVERAGE VALUES AND VARIETY OF THE INDICATORS UNDER STUDY AT THE BEGINNING AND AT THE END OF THE SPORT-PEDAGOGICAL EXPERIMENT**

**Comparison of the variety between the first and second study of “Lokomotiv” team - Novosibirsk**

Fig. №19 presents the comparative analysis of the physical development signs following both studies. Analyzing the figure, we have established that stability of the values of all signs under study is observed for both studies. Following the second test, a little bit higher value of ( $V_4=12,13\%$ ) is observed, which shows that the group is already homogeneous in relation to the body fat.

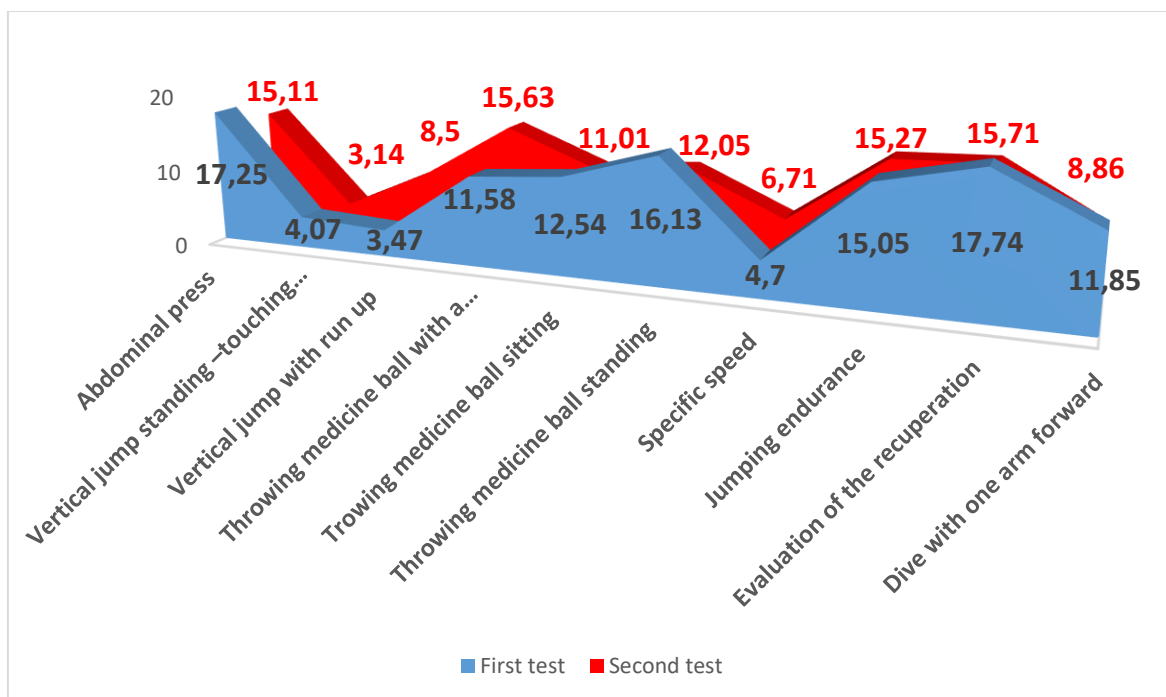


**Fig. №19 Comparative analysis of the physical development signs dispersal**

**Fig. №20** presents comparative analysis of the physical preparedness signs dispersal following both tests.

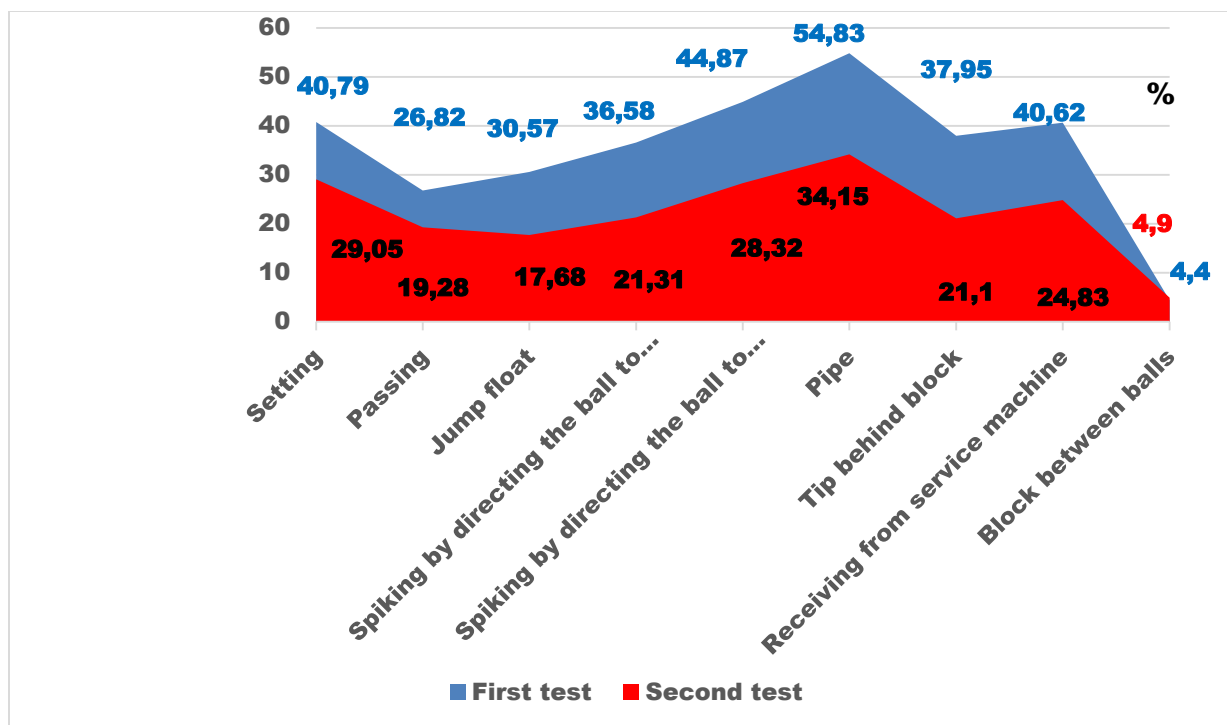
The group is homogeneous in relation to three of the signs under study during both tests. These are indicators concerning the explosive strength of the lower limbs while standing under vertical efforts and by specific speed.

In relation to the indicators referred to the explosive strength of the upper limbs and shoulders, the values of the variation coefficient are already within the norms of relative homogeneity after the second test. In relation to the rest three signs referred to the abdominal muscles, jumping endurance and the test for “evaluation of the recuperation”, the coefficient values show that the group is relatively homogeneous for both tests.



**Fig. №20 Comparative analysis of the physical preparedness signs dispersal**

**Fig. №21** presents the comparative analysis of the technical preparedness signs dispersal for both tests. Analyzing the figure, it immediately impresses that following the second test, lower values of the variation coefficient are observed for all signs under study. It should be noted that after the second test the group from non-homogeneous becomes relatively homogeneous according to six indicators. These are the signs related to the specific volleyball setting in the target (first –  $V_{16}=40,79\%$ , second -  $V_{16}=29,05\%$ ), serving in zone 6 (first –  $V_{18}=30,57\%$ , second -  $V_{18}=17,68\%$ ), spiking zone 1 (first –  $V_{19}=36,58\%$ , second -  $V_{19}=21,31\%$ ), spiking zone 5 (first–  $V_{20}=44,87\%$ , second –  $V_{20}=28,23\%$ ), as well tip behind block and receiving from service machine. For both tests non-homogeneity is observed for indicator №21 “spiking from zone 6” (first –  $V_{21}=54,83\%$ , second –  $V_{21}=34,15\%$ ). That is an indicator providing information about the complexity of the performance related to its specificity because of the fact that „the outside hitters“ attack from that zone.



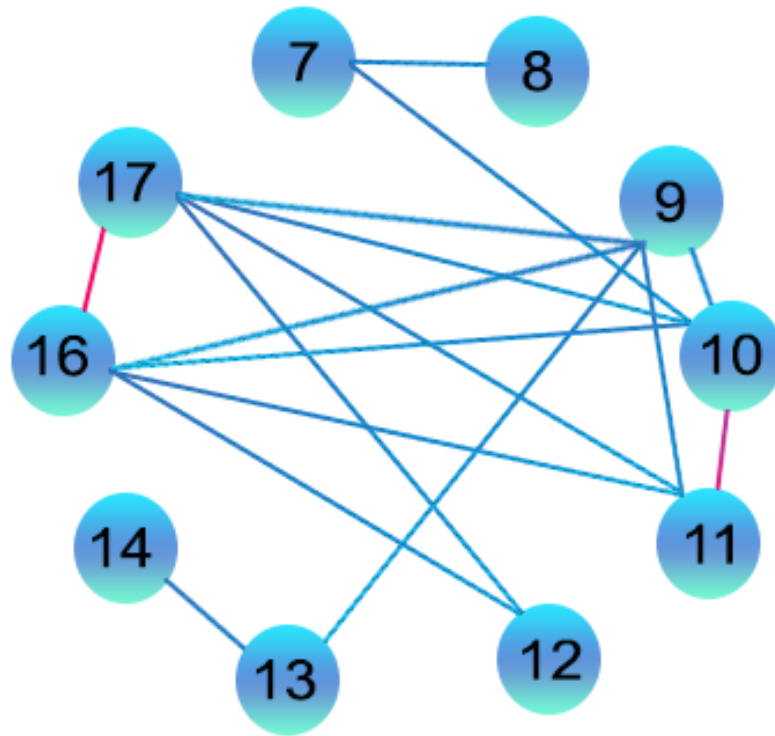
**Fig. №21 Comparative analysis of the technique-tactic preparedness signs dispersal**

It should be noted that there is an indicator about which the values of the variation coefficient are slightly increased following the second test. That is the sign related to the skills of the players to imitate block. Anyway we think this is not troublesome because the group is strongly homogeneous during both tests.

### **III.3 Relations and dependence between the indicators for the physical and technique-tactic preparedness**

Disclosure and quantitative evaluation of the relations for the physical and technique-tactic preparedness provide the possibility for optimization of the training process in relation to the strategic plan.





**Fig. №24 Correlation dependences of the physical development signs.**

From the data of the intercorrelation matrix (**fig.№24**) impressive is the availability of two great dependences of the physical development signs – between (I<sub>10</sub>) „Throwing medicine ball sitting“ and (I<sub>11</sub>) „Throwing medicine ball standing“ ( $r=0,833$ ). Both tests are indicative for the upper limbs strength and prepare the competitors towards the completely volleyball move sett. That strength is exceptionally needed because preciseness is necessary for the sett from various distances. Having shown high results in both tests, more attention is necessary to be given during the training to the technical part for transforming the physical strength into technical skill. The second great dependence is between (I<sub>16</sub>) „setting“ and (I<sub>17</sub>) „passing“ ( $r=0,769$ ). That great dependence is expected and easily predictable as these are two basic and component elements of the game. They are taught at the beginning of the volleyball players education and continue during the period of their

perfection. Correlation is directly proportional (with positive mark) which means that during the training process these two skills are similarly available and the sett leads to the improvement of the pass or vice versa.

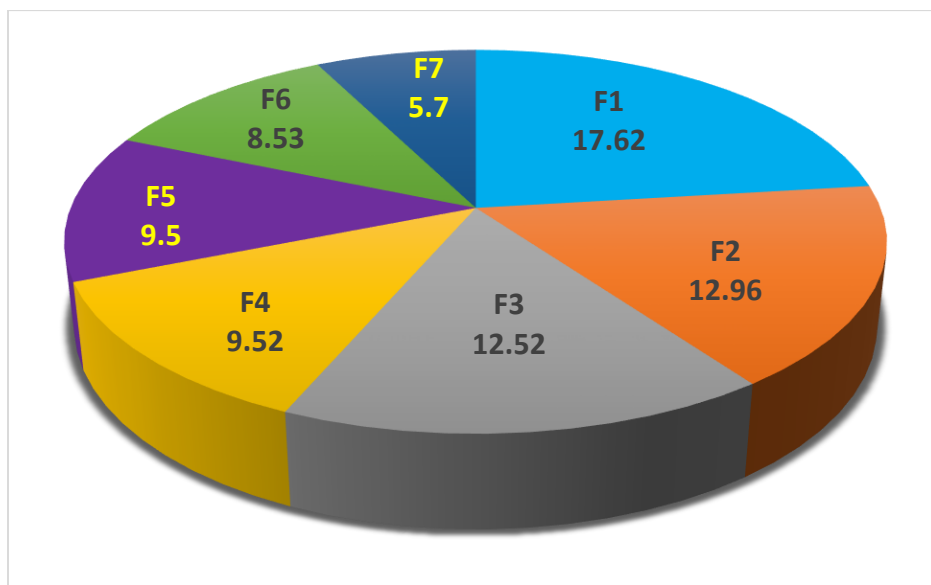
Considerable dependence is observed for 14 number of relations between the separate signs. The great number of considerable dependences show the correct interrelation when choosing the tests which maximum closely reflect the real game moves together with the development of the technical skills.

The following more important conclusions for the management of the training process of elite male volleyball players can be made from the existing correlation dependences within the correlation-structure model and the analysis made:

1. Sett and pass have considerable dependence with various types of throws and specific speed as well as great dependence between them both.
2. The considerable and moderate relations between the jump from standing position and the other indicators for the physical and technical preparedness should be taken in mind when a general evaluation of the sport preparation is made.
3. Jumping endurance is with high values towards setting and passing, attack and block.
4. The successful motions during attack are based and influenced by the specific high reach of the volleyball players which should be reckoned for during the team selection.
5. Technical elements have combined influence on the specific speed and should be recorded during the sport preparation control.

### III.4. FACTOR STRUCTURE OF ALL SIGNS UNDER STUDY

This is a procedure with the help of great number of variables which are found to smaller quantity of undependable influencing quantities, called factors. Factor analysis classify the characteristics (variables) which describe the observations. The factor structure Rotated Component Matrix for elite volleyball players is established by 7 basic factors and taking in mind their factor weight we can define the type and the qualitative influence between them (**fig.№25**). The initial dispersion of the phenomenon under study is high (**76,46%**).



*Fig.№25 Relative share in % of the initial dispersion of elite volleyball players explained by each factor*

The **first factor** in the factor structure of the physical development and the specific workability of elite male volleyball players is defined by six basic indicators. That factor is of highest percentage from the initial dispersion of the phenomenon under study (**17.62%**). The factor can be defined as complex because it combines both strength of the upper and lower limbs with preciseness in pass and sett as well as specific speed.

The *second factor* in the factor structure – of the physical development and specific workability for elite male volleyball players is defined by four basic indicators. That factor is of high percent from the initial dispersion of the phenomenon under study (**12,96%**). The indicators defining this factor are related to the evaluation of the recuperation test, fast movement to block, jumping endurance at block and the vertical high jump with both legs from standing position with both arms in front of chest (block). The second factor can be defined as block factor.

The *third factor* defines the influence of the vertical high reach with one arm and the vertical high reach with both arms with the vertical jump with run up and touch with one arm. This factor is with (**12.52%**) from the initial dispersion of the phenomenon under study.

The *fourth factor* explains (**9,52%**) of the indicators dispersion and bears information about the exactness in attack. Four are the factors in the factor structure of the physical development and specific workability of elite male volleyball players. This factor discloses the high importance of the skills and preciseness upon spiking zone 1, spiking zone 5, spiking from zone 6 and tip behind block of the totality under study. That allows to identify it as attacking factor.

The *fifth factor* in the factor structure of the physical development and the specific workability of elite male volleyball players is defined by two basic indicators. This factor is of (**9.50%**) from the initial dispersion of the phenomenon under study. The indicators defining this factor are related to the test for dive with one arm forward and service in zone 6.

The *sixth factor* defines the influence of the body mass, body fat and muscle mass. This factor is of (**8,53%**) from the initial dispersion of the phenomenon under study and can be defined as anthropometric.

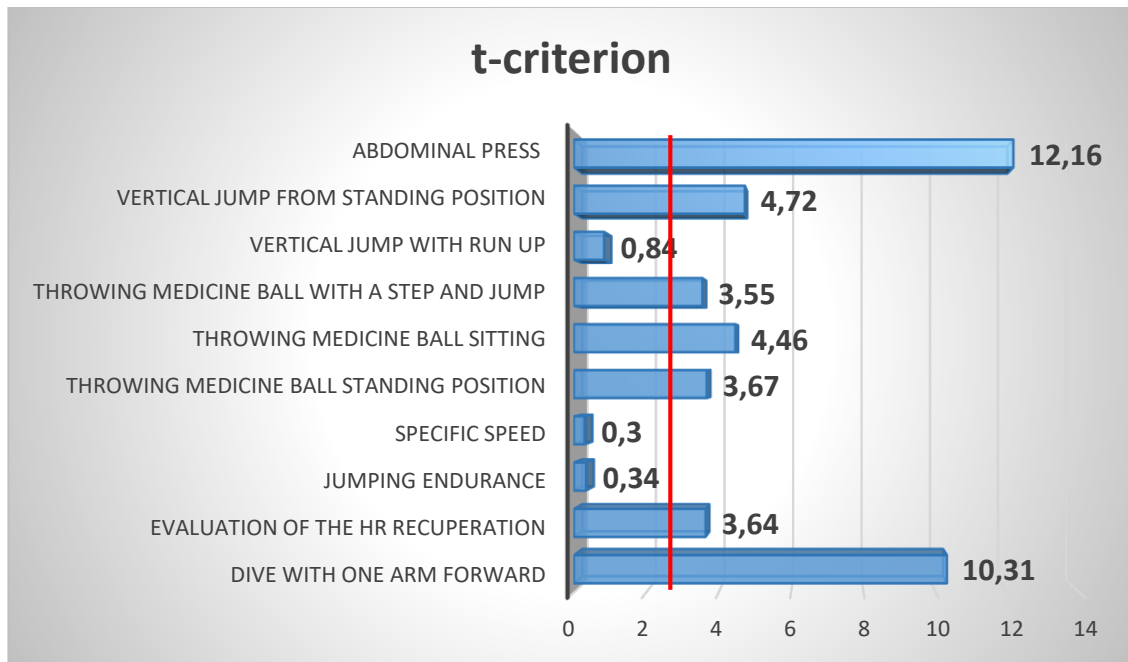
The *seventh factor* in the factor structure of the physical development and specific workability of elite male volleyball players is defined by two basic indicators. This factor is of (5,78%) from the initial dispersion of the phenomenon under study. The indicators defining this factor are related to the abdominal press and receiving from service machine tests.

### **III.5. SPORT PEDAGOGICAL EXPERIMENT FOR ESTABLISHING THE EFFECTIVENESS OF THE SPECIFIC TRAINING PROGRAMME**

#### **III.5.1. Establishing the influence and effectiveness of the training programme and importance of the growth in the experimental group**

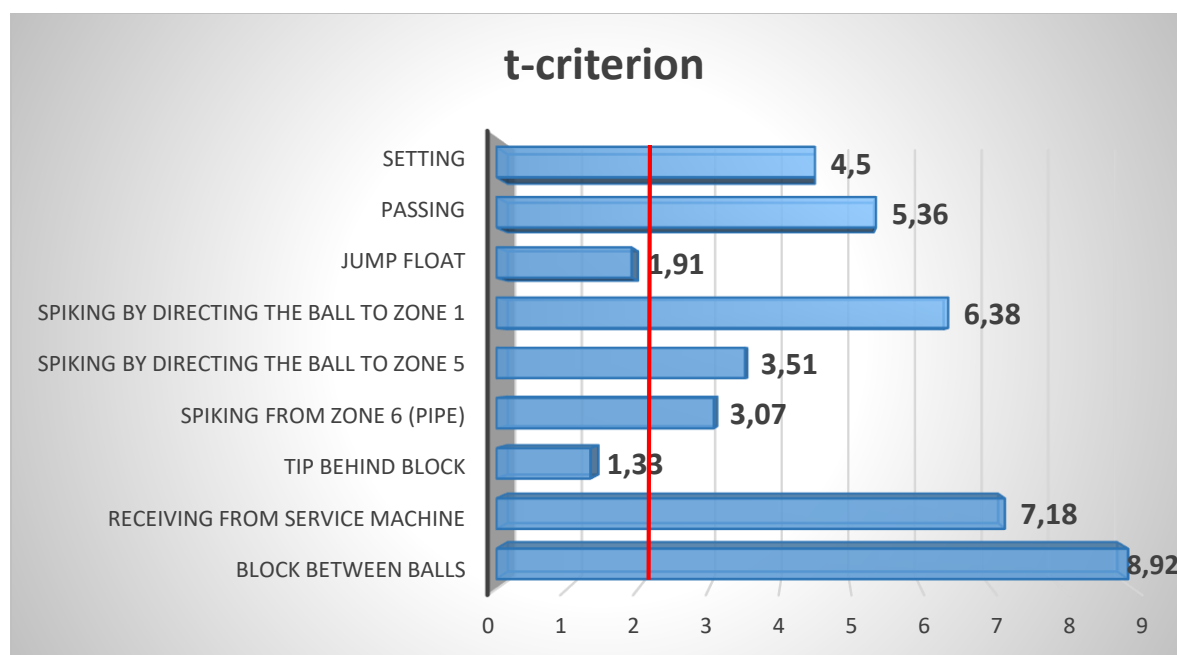
Growth of the average levels for all indicators is observed at the end of the preparatory period. Following the analysis of the results, the male volleyball players from the experimental group have achieved serious results for jumping from standing position and following run up.

It is observed from the results presented in (**fig.№ 34**) that for 3 indicators the t-criterion values are lower than the tabular one. For seven indicators ( $t_6=12,16$ ), ( $t_7=4,72$ ), ( $t_9=3,55$ ), ( $t_{10}=4,46$ ), ( $t_{11}=3,67$ ), ( $t_{12}=5,90$ ), ( $t_{14}=3,64$ ), ( $t_{15}=10,31$ ) the empiric value is higher than the tabular ( $t_{\text{table}}=2.20$ ) which means that the alternative hypothesis is accepted as true; according to which the asserted differences between Ist test and the IInd test in relation to the explosive strength of the upper and lower limbs and the recuperation are statistically important ( $K=11$ ,  $t_{\text{critical}} = 2.20$ ).



**Fig. №34 Reliability of the growth on the indicators for the physical preparedness of the experimental group**

For seven indicators (**fig. №36**) (setting in the target, passing in the target, spiking from zone 1, spiking in zone 5, spiking from zone 6, receiving from service machine, imitating block) the empiric value is higher than the tabular ( $t_{\text{table}}=2.20$ ), which means that the alternative hypothesis is accepted as true and according to which the asserted differences between test I and test II in relation to setting/passing, attack and receiving are important.

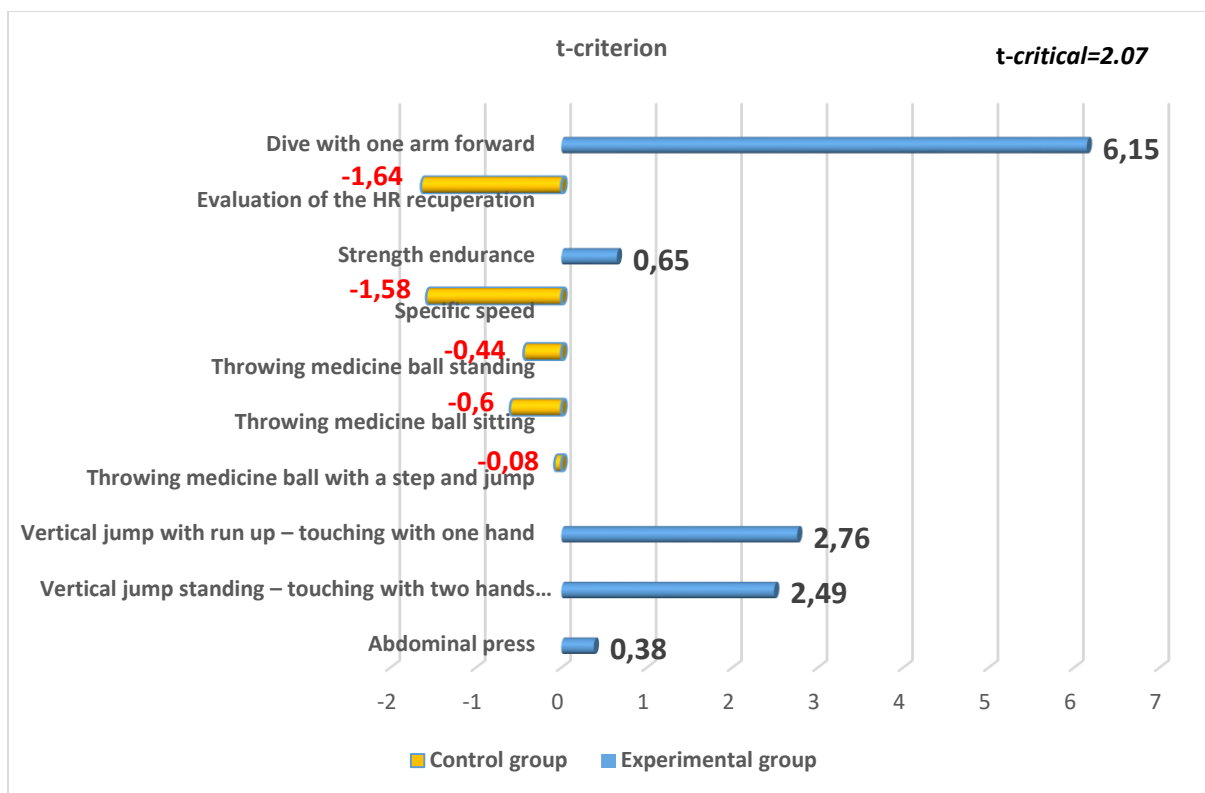


*Fig. №36 Reliability of the growth of the technique-tactic preparedness indicators for the experimental group*

### **III.5.2 Importance of the differences between the average levels of the results for the experimental and control group after the end of the experiment**

With the present study and by applying an overall training programme to the control group, based on changes in the quantitative and qualitative correlations of the work done during the separate micro cycles of the preparatory period, the specific workability of the male volleyball players has been increased. Increase of the results was observed for the control group working on asserted Russian education programme during the training process too.

The importance of the differences between the average levels of physical preparedness between both groups at the end of the study is presented in (**fig. №41**).

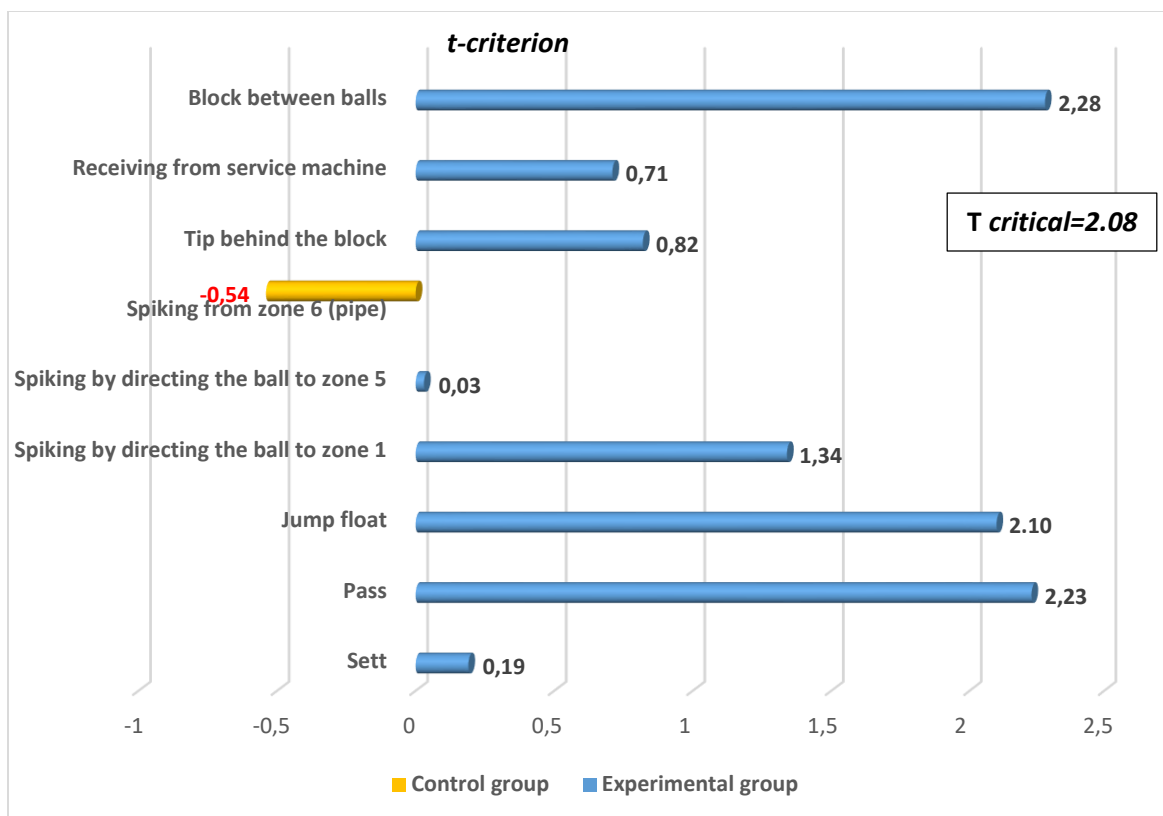


**Fig. №41 Importance of the differences between the average levels of physical preparedness of the experimental and control groups at the end of the experiment**

The high t-criterion values show that the experimental group statistically is considerably better than the control group on three of the physical preparedness signs, which are related to the ability for jumping from standing position ( $t_7=2.49$ ), jumping with run up ( $t_8=2.76$ ) and dive with one arm forward ( $t_{15}=6.15$ ). The t-criterion values are supported by high guarantee probability too  $P_t \geq 95\%$ .

The importance between the average levels for the technical-tactical preparedness between both groups at the end of the experiment is presented in (fig. №43).





**Fig. №43 Importance of the differences between the average levels of the technical-tactical preparedness for the experimental and control groups at the end of the experiment**

The high t-criterion values show that the experimental group statistically is importantly better than the control group on indicators related to the blocking ability ( $t_{24}=2.28$ ), pass ( $t_{17}=2.23$ ) and service ( $t_{18}=2.10$ ). The high t-criterion value is supported by high guarantee probability too  $P_t \geq 95\%$ .

## IV. Conclusions and recommendations

### IV. 1. Conclusions

The analysis of the results of our study and the summing up allow to formulate the following basic conclusions:

1. Upon developing the training programmes, the coaches inquired point out various priorities in their work as well as different arrangement of the means for achieving an optimal sport form at the beginning of the competitive period.

Predominating is the coaches' view that around 49% of the work is related to condition preparation during the general preparatory period, while during the specific preparatory one 35% and 34% are used by the coaches for tactical and technical preparation.

2. The analysis of the average values and variety of the signs for all volleyball players show that at the beginning of the experiment, they are homogeneous in relation to the physical development signs ( $V \leq 10\%$ ), as well as non-homogeneous for greater part of the physical preparedness indicators with values of  $V$  from 11,46% to 31,04%. For the technical-tactical preparedness indicators there exist a great variety of homogeneity and non-homogeneity of the groups, with values of  $V$  from 8,03% to 62,53%. There have arisen positive changes at the end of the experiment – the varying coefficient is considerably decreased for all indicators.
3. The established importance of the differences of the signs under study for the elite male volleyball players at the beginning of the study appear as proof that the experimental and control group do not differ reliably statistically.
4. The established importance of the differences of the signs under study for the experimental group at the end of the experiment provide us with the reason to accept the alternative hypothesis as true; according to it, the positive growth of the volleyball players is reliable statistically.
5. Our hypothesis is confirmed with high guarantee probability. The statistically important differences of the experimental group's growth proved in comparison with the control group show that the specific training programme applied in the education-training process during the preparatory period effected positively the volleyball players. That was confirmed by the final classification in the championship where "Lokomotiv" team (Novosibirsk) became the champion of Russia.

6. The analysis of the correlation matrix and the established correlation dependences between the signs under study, prove that:
  - Setting and passing are considerably dependent on the various type of throwing and the specific speed, as well as there exist great dependence between both of them;
  - Successful actions in attack are based and influenced by the specific high reach of the volleyball players;
  - Technique elements of the game have combined effect on the specific speed.
7. The factor structure of the physical development, physical preparedness and technique-tactic preparedness indicators taken to the front led to the conclusion that 76,46% of the extracted factors influence the specific workability of the volleyball players. The binding the technique of setting and passing with the specific speed and the explosive strength of the upper limbs is of highest factor weight.
8. The developed, probated and applied programme for management of the training process during the preparatory period has resulted in qualitative and quantitative changes in the specific workability of elite male volleyball players.

#### **IV. 2. Recommendations**

With the purpose of increasing the quality of managing the training process during the preparatory period of elite male volleyball players, we recommend:

1. We recommend to the coaches working with elite volleyball players to make use of the model of planning in the preparation during the preparatory period developed by us.
2. We recommend to the coaches working with elite volleyball players to make use of the training programme applied by us with the purpose to increasing the specific workability of the competitors.

3. We recommend to the coaches working with elite volleyball players to make use of the test battery applied by us as means for control of the preparation.
4. We recommend to the Bulgarian Volleyball Federation to acquaint the elite coaches with the scientific-applied, sport-theoretical and practical aspects of our study through appropriate forms – seminars, methodological instructions, etc.

## **5. PUBLICATIONS RELATED TO THE THEME OF THE DOCTOR'S THESES**

1. **Петров, Г., В. Наумов.** Программирование тренировочного процесса юнных волейболистов в подготовительном периоде. Материалы Всероссийской научно-практической конференции с международным участием „Актуальные научно-методические проблемы подготовки спортсменов в игровых видах спорта“. ISBN 987-5-6043177-1-6, Москва, 2019, стр.100 -103
2. **Петров, Г.** Вариативност на признаците на специфичната работоспособност при висококвалифицирани волейболисти. Педагогически алманах, Педагогическо списание на Великотърновски университет „Св. Св. Кирил и Методий“. ISSN 1310-358X, Том 27, Брой 2, 2019, стр. 293 - 298.
3. **Петров, Г., В. Антонова, Ст. Димитров.** Основни насоки в работата на треньорите по волейбол в подготвителния период. Годишник на Национална спортна академия „Васил Левски“, София, НСА ПРЕС, 2020, стр. 206 - 213.